ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS
(Choice Based Credit System)

R20

CSE (Cyber Security)

For

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for batches admitted from 2022-2023)

SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

SEETHARAMAPURAM, NARSAPUR-534 280, W.G.DT., A.P.

ACADEMIC REGULATIONS

1. INTRODUCTION

Swarnandhra College of Engineering & Technology (**Subsequently referred to as SCET**) will be followed the norms of Jawaharlal Nehru Technological University Kakinada and Govt. of Andhra Pradesh.

All Academic Programme rules and regulations are approved by the Academic Council, which is the highest Academic body of the Institute. It is applicable for all Bachelor of Technology (B. Tech) degree programme from academic year 2020-21.

2. ADMISSIONS

2.1 Regular Admission

(Join in first year B. Tech Programme)

Admissions in the Institution are classified into **CATEGORY – A,** through convener, EAMCET and **CATEGORY- B** filled by the college management.

2.2 Lateral Entry Admission

(Join in the Second year/third semester of B. Tech Programme)

Eligibility: Diploma in Engineering / B.Sc Degree with Mathematics as one course.

Based on the rank secured by the candidate at the Engineering Common Entrance Test (ECET), conducted by APSCHE, Government of Andhra Pradesh.

2.3 Advance standing Admission

(Transfer from other Colleges/ Re-admission due to dis-continuation)

These may arise in the following cases:

a) When a student seeks transfer from other colleges to SCET and desirous to pursue the study at SCET in an eligible branch of study.
b) When students of SCET get transferred from one regulation to another regulation.

In all such cases, approval is mandatory from the statutory bodies

3. UNDER GRADUATE (UG) PROGRAMMES OFFERED

The College is offering the following programmes:

- Computer Science and Engineering (CSE)
- Electronics and communication Engineering (ECE)
- Electrical and Electronics Engineering (EEE)
- Information Technology (IT)
- Mechanical Engineering (ME)
- Civil Engineering (CE)
- Artificial Intelligence and Machine Learning (AI&ML)
- Computer Science and Engineering(Cyber Security)
- Computer Science and Engineering & Business Systems
- Robotics (ROBO)

3.1 Structure of the Programme:

i) **Preamble:**

It is emphasized in UGC Guidelines on Choice Based Credit System (CBCS), that the important measures taken to enhance academic standards and quality in higher education include innovation and improvements in curriculum, teaching-learning process, examination and evaluation systems, besides governance and other matters. It is adopted grading system in place of conventional system of marks and percentages.

CBCS provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The students can register any course of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach through open electives.

Key words CBCS, such as Course, credit, credit point, CGPA, SGPA, Grade Point, Letter Grades as given in the UGC guidelines are used the same definitions.

Each Programme consists of:

- Foundation courses in Basic Sciences, Engineering Sciences, Humanities and social science including management courses.
- Professional core Courses to impart broad knowledge.
- Professional Elective Courses from the discipline or interdisciplinary areas / industry related opted by the student based on their interest in specialization.
- Open Elective Courses from the interdisciplinary areas opted by the students based on their interest in specialization.
- Mandatory Courses, Internship, Seminar, Project work.
- Skill Oriented Courses to up skilling the graduates on the skills relevant to the need and demands of the industry.

Each Programme designed to have 35-40 theory courses, 20-25 laboratory courses and 05 Skill Oriented Courses. The categories of courses are indicated in the following table.

A three-week induction program is mandatory for all first year UG students and shall be conducted as per AICTE/UGC/APSCHE guidelines.

TABLE-1 CATEGORY OF COURSES

S. No.	Category	Code
1	Humanities and social science including Management courses	HSMC
2	Basic Science courses	BSC
3	Engineering courses science	ESC
4	Professional core Courses	PCC
5	Open Elective Courses	OEC
6	Professional Elective Courses	PEC
7	Internship, seminar, project work	PROJ
8	Skill Oriented Courses	SC
9	Laboratory Courses	LC
10	Mandatory courses	MC

Note: All components prescribed in the curriculum will be conducted and evaluated.

MOOCS: A student shall be permitted to pursue up to a maximum of two elective courses under MOOCs during the Programme. Each of the courses must be of minimum 12 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to pursue and acquire a certificate for a MOOC course only from the organizations/agencies approved by the BoS in order to earn the 3 credits. The Head of the department shall notify the list of such courses at the beginning of the semester.

ii) **Contact hours:** Depending on the complexity and volume of the course, the number of contact hours per week will be determined.

iii) **Credits:**

TABLE-2 CREDITS BASED ON CONTACT HOURS

Course type	No. of Contact Hours	No. of Credits
Theory	1	1
Practical	2	1

TABLE-3 CREDITS FOR DIFFERENT COURSES

Course type	Lecture method			Credits
	L	T	P	C
Theory/Elective	2	1	0	3
	3	0	0	3
	2	0	2	3
	2	0	0	2
Laboratory	0	0	2	1
	0	0	3	1.5
	0	0	4	2
Skill Oriented Courses	1	0	2	2

3.2 Curriculum for each Programme:

- All Four year B. Tech Programme of study is formulated based on the guidelines mentioned in 3.1 and recommended by the concerned Board of Studies (BoS) and approved by the Academic Council (AC).
- The same curriculum will be applicable for lateral entry students from 3rd semester onwards.
- For advance standing admission, the equivalent curriculum will be prepared by BoS and approved by AC.

4 DURATION OF THE PROGRAMME:

The duration of the B. Tech. Programme is four academic years consisting of eight semesters. Students, who fail to fulfill all the academic requirements for the award of the degree within the prescribed duration as per article 4.1, will forfeit their admission in B. Tech**.**

4.1 Maximum duration of study.

Maximum duration permitted for completion of the B. Tech. Programme of study will be:

Regular Admission: Eight academic years in sequence from the year of admission for a student admitted into first year of any Programme.

Lateral Entry Admission: Six academic years in sequence from the year of admission for a student admitted into second year of any Programme.

Advanced standing Admission: The maximum time for completion of Programme of study, will be twice the period in terms of academic years in sequence, with prescribed curriculum.

TABLE- 4 MAXIMUM DURATION OF STUDY

Admitted year of study	Maximum duration
First year	8 Academic years in sequence
Second year (Lateral entry)	6 Academic years in sequence
Advanced standing	Twice the period in terms of academic years in sequence

5 DISTRIBUTION AND WEIGHTAGE OF MARKS:

Each semester consists of 4/5/6 theory courses and 4/3/2 Laboratory courses. However, in the 8th semester there will be only project work / internship in industry.

(a). **Theory Courses:**

- Each course consists of five units.
- All courses will be evaluated with a maximum of 100 marks.
- Marks distribution will be 30 marks for internal evaluation and 70 marks for the end semester examination.
- The internal evaluation of 30 marks consists of two mid exams for 20 marks and five class tests for 10 marks.
- Mid Examination: Each mid examination will be conducted for 20 marks with the duration of 75 Minutes. Internal test paper consists of three questions (8M+8M+4M) from two and half units and all are to be answered.
- **Weighted average of two mid exams** performance will be considered, weightage of 80% for the best mid marks and 20% for the second.
- **Class tests for 10 marks calculation**: There will be one class test conducted in each unit. Average of **Best three** will be considered.
- The **end semester** examination will be conducted for 70 marks which covers full syllabus. In end examination pattern, **Part – A** consists of five short questions from all units (Brainstorming/Thought provoking/Case study) for 10 marks. **Part – B** has **5 questions** with internal choice from each unit and valued for 60 marks.
- Internal Marks will be considered for three academic years only if the candidates will not completed the concern course because of less than 12 internal marks. Thereafter the candidate writes external examination for 70 which will be converted to 100 but the candidate must get minimum 40 %.

(b). **Practical Courses:**

- All courses will be evaluated with a maximum of 100 marks.
- Marks distribution will be 30 marks for internal evaluation and 70 marks for the end semester examination.
- End practical examination will be conducted by the internal and external examiner appointed by COE.
- Internal evaluation will be a continuous assessment during the semester for 30 marks with 15 marks for day-to-day work, including record valuation and 15 marks for internal test.

(c). **Design or Engineering Drawing Marks Distribution:** For the courses of design or drawing such as Engineering Graphics, etc., the distribution will be 30 marks for internal evaluation with 10 marks for day-to-day work, and 20 marks from two internal test (80%

of first best + 20% of second best). End examination will be conducted for 70 marks.

(d) **Summer Internship:** It can be carried out with a minimum of Six weeks and maximum Eight weeks duration at end of 4th semester and 6th semester. The internship can be done by the students at local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs. It will be evaluated internally by an internal evaluation committee comprising of Head of the Department and two faculty of the department. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee. The report and the oral presentation shall carry 40% and 60% weightage respectively. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits

(e) **Full Internship and Project Work:** The 8th Semester Project Work with full internship will be evaluated for 200 Marks. The project work is evaluated for internal assessment of 60 and external Examination for 140. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.

i) Internal Assessment: Internal Assessment will be monitored by Project Review Committee consists of Head of the Department , Supervisor and Senior faculty member on the basis of two seminars and the internal marks will be awarded by Project Supervisor with recommendation of PRC.

ii) External Examination: External Examination will be conducted by Project external examination committee consists of Head of the Department, Supervisor and External examiner appointed by CoE , through presentation / viva - voce by the student.

9. Community Service Project (Experiential Learning through Community Engagement):

Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development. Community Service Project is meant to link the community with the college for mutual benefit. Community Service Project is an integral part of the curriculum with 4 Credits and evaluated internally for 100 marks.

Objectives:

- To sensitize the students to the living conditions of the people who are around them,
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
- To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.

- ❖ To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project:

1. Every student should put in a minimum of 180 hours for the Community Service Project during the summer/ Semester vacation.
2. Each class/section should be assigned with a mentor
3. Specific Departments could concentrate on their major areas of concern.
4. A log book has to be maintained by each of the student, where the activities undertaken / involved to be recorded.
5. The log book has to be countersigned by the concerned mentor/faculty in charge.
6. Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
7. The final evaluation to be reflected in the grade memo of the student.
8. The Community Service Project should be different from the regular programs of NSS / NCC / Green Corps / Red Ribbon Club, etc.
9. Minor project report should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
10. The Project Log-, Project Implementation, Project report and Presentation shall carry 20%, 30%, 25% and 25% weightage respectively. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

TABLE- 5 MARKS ALLOCATION

Course type	Marks Allocation			
	Internal		End Semester	Total
	Internal test	Class Test/ Day to day work		
Theory course	20	10	70	100
Laboratory course	15	15	70	100
Design or Drawing course	20	10	70	100
Skill Oriented Courses	15	15	70	100
Summer Internship	50		-	50
Community Service Project	100		-	100
Project Work	60		140	200

(f) **Mandatory Courses**:
These courses are compulsory with zero credits. Only internal examination will be conducted and student has to secure minimum 40% of the marks in the evaluation for passing the course. The minimum attendance requirement is 75 %.

(g) **Open Electives:** Students are to choose Open Elective – I during 5th Semester, Open Elective–II during 6th Semester and Open Elective – III and IV during 7th Semester from the list of Open Electives given in the Course Structure. However, students cannot opt for an Open Elective Subject offered by their own (parent) Department, if it is already listed under any category of the courses offered by the parent Department in any Semester.

(h) **Skill Oriented Courses:**

i) A pool of interdisciplinary and job-oriented mandatory skill courses which are relevant to the industry are integrated into the curriculum of concerned branch of engineering.

ii) For these courses, one theory and two practical hours may be allotted as approved by the concerned BOS.

iii) The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies/APSSDC or any other accredited bodies as approved by the concerned BoS.

iv) Every year the concerned BoS review the skill oriented courses based on industrial demand which are offered by the eligible external agencies and college.

v) Marks distribution will be 30 marks for internal evaluation and 70 marks for the end semester examination. End examination will be conducted by the internal and external examiner appointed by COE. Internal evaluation will be a continuous assessment during the semester for 30 marks with 15 marks for day-to-day work, including record valuation and 15 marks for internal test.

vi) If a student chooses a Certificate Course offered by industries/Professional bodies/APSSDC or any other accredited bodies, in lieu of the skill advanced course offered by the Department, the credits shall be awarded depends on the Course Completion Certificate.

vii) College academic committee evaluates the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.

viii) There are five (05) skill-oriented courses shall be offered during III to VII semesters.

ix) Out of the five skill courses two shall be skill-oriented courses from the same domain and shall be completed in second year. Of the remaining 3 skill courses, one shall be necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or Job oriented skill courses, which can be of interdisciplinary nature.

10. ATTENDANCE REQUIREMENTS

(i) A student will be eligible to appear for end semester examinations, if he/she acquired a minimum of 75% of attendance in aggregate of all the courses.

(ii) Condonation of shortage of attendance in aggregate up to 10% on medical grounds (Above 65% and below 75%) in any semester may be granted by the College Academic Committee.

(iii) Shortage of Attendance below 65% in aggregate shall not be condoned.

(iv) Students with less than 65% of attendance in any semester are not eligible to take up their end examination of that particular semester and their registration for previous semesters examinations shall be allowed.

(v) Attendance may also be condoned for those who participate in Inter Collegiate/university sports, co- and extracurricular activities provided their attendance is in the minimum prescribed range for the purpose (>65%) and recommended by the concerned authority. He/ She shall pay the prescribed Condonation fee.

(vi) Prescribed Condonation fee shall be payable by the student to appear for the end examination.

(vii) A Student will not be promoted to the next semester unless he/she satisfies the attendance requirement of the present semester as applicable. They may seek re-admission for that semester as and when offered consecutively.

(viii) A student will be condoned only four times for regular student and three times for

lateral entry students during entire course of study.

(ix) For induction programme attendance shall be maintained as per AICTE norms.

TABLE-7 ATTENDANCE REQUIREMENT

Attendance Percentage	Condonation fee	Appear End Exams
Above 75 %	Nil	Eligible
65 % -75%	Yes (on medical grounds)	Eligible
Below 65 %	Nil	Not Eligible (Seek re-admission to that semester when offered)

11. MINIMUM ACADEMIC REQUIREMENTS:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in **S.No.9.**

(i) A student will be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical or design or drawing subject or project if he/she secures not less than a minimum of 35% of marks exclusively in the end semester examinations in each of the courses, for which the candidate had appeared. However, the candidate should have secured a minimum of 40% marks in both external and internal components put together to declare eligible for pass..

(ii) A student will be promoted from first semester to second semester, second semester to third and third to fourth semester, if he/she satisfies the minimum attendance requirement.

(iii) A student will be promoted from 4^{th} to 5^{th} Semester (2^{nd} year to 3^{rd} year), if he/she fulfills the academic requirements of 40% of the credits up to either 3^{rd} or 4^{th} Semester from all the examinations (Regular and supplementary) whether or not the candidate takes the examinations.

(iv) A student will be promoted from 6^{th} to 7^{th} Semester (3^{rd} year to 4^{th} year), only if he/she fulfills the academic requirements of 40% of the credits up to either 5^{th} or6^{th} Semester from, all the examinations (regular and supply) whether or not the candidate takes the examinations.

(v) When a student is detained for lack of credits/shortage of attendance, he may be re-admitted into the same semester/year in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

TABLE-8 PROMOTION IN TO NEXT HIGHER CLASS

Promotion		Promotion Criteria
From	To	
1st Semester	2nd Semester	Minimum Attendance requirement
2nd Semester	3rd Semester	
3rd Semester	4th Semester	
4th Semester	5th Semester	Minimum Attendance requirement & 40% of credits up to either 3rd or 4th semester from all exams
5th Semester	6th Semester	Minimum Attendance requirement
6th Semester	7th Semester	Minimum Attendance requirement & 40% of credits up to either 5th or 6th semester from all exams
7th Semester	8th Semester	Minimum Attendance requirement

12. GAP YEAR CONCEPT

Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year study, after the 4th Semester with the due recommendations of the GAP committee and approved by the principal. This may be extended to two years at the most which period is not counted for the maximum time for graduation.

13. AWARD OF B.TECH DEGREE:

A student shall be eligible for award of the B.Tech. Degree if he/she fulfills all the following conditions:

(i) Pursue the programme of study for a stipulated period of four years and not more than eight years.

(ii) Register for 160 credits and secure the same.

(iii) Registered and successfully completed all the components prescribed in the programme of study in which he/she is admitted.

(iv) All mandatory courses must be completed with satisfactory.

(vi) Obtained CGPA greater than or equal to 5.0 (minimum requirements for pass).

(vii) A student shall be eligible for the award of B.Tech degree with Honors or Minor if he/she earns 20 credits in addition to the 160 credits. A student shall be permitted to register either for Honors or for Minor and not for both simultaneously.

(viii) All students shall register for NCC/NSS activities and will be required to participate in an activity specified by NSS officer during first two years. Grade shall be awarded as Satisfactory or Unsatisfactory in the mark sheet on the basis of participation, attendance,

performance and behavior. If a student gets an unsatisfactory Grade, he/she shall repeat the above activity in the subsequent years in order to complete the degree requirements.

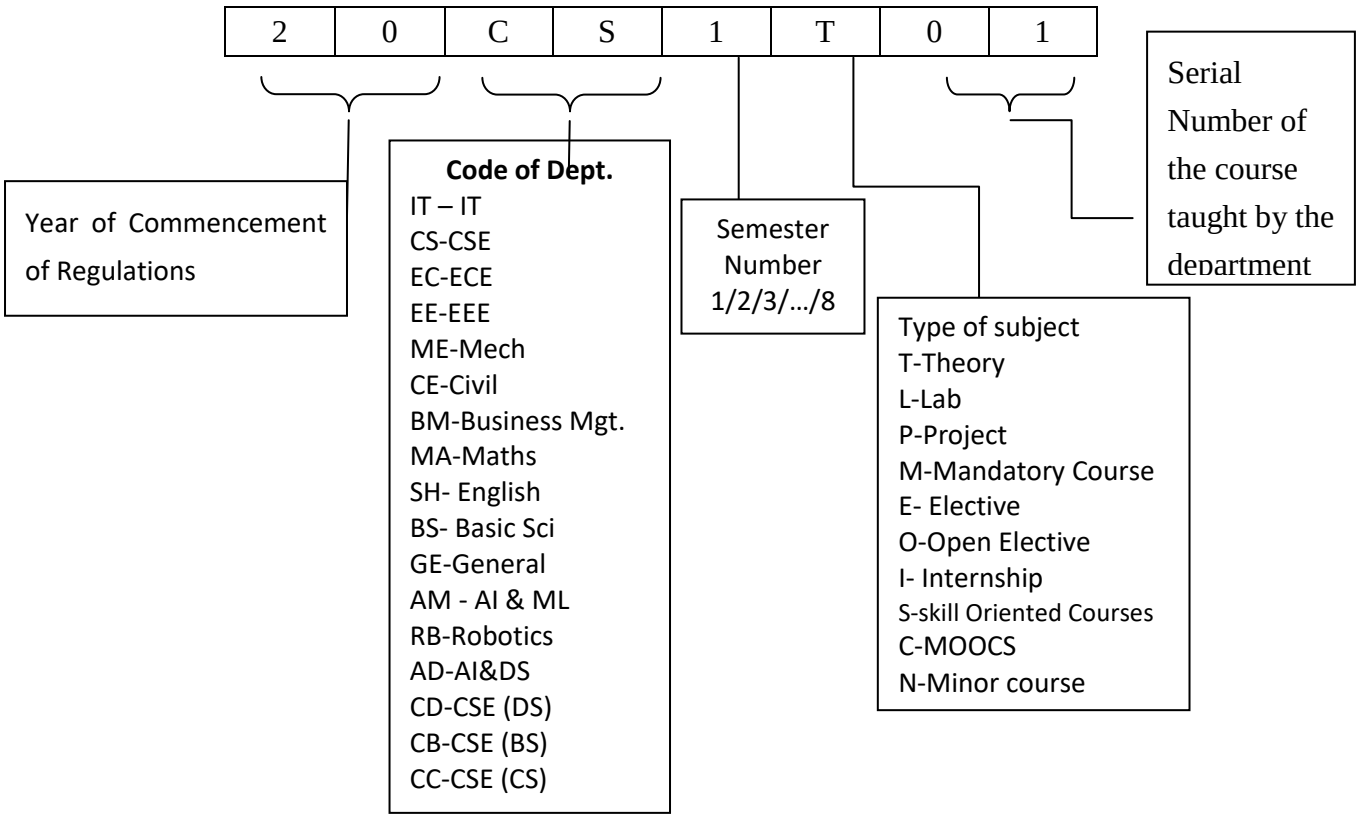
(ix) Courses like Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc., shall be included in the curriculum as non-credit mandatory courses. Environmental Sciences is to be offered compulsorily as mandatory course for all branches. A student has to secure 40% of the marks allotted in the internal evaluation for passing the course. No marks or letter grade shall be allotted for all mandatory non-credit courses.

14. AWARD OF B. TECH. (HONOR)/B. TECH. (MINOR):

B. Tech. with Honors or a B. Tech. with a Minor will be awarded if the student earns 20 additional credits are acquired as per the regulations/guidelines. Registering for Honors/Minor is optional.(Refer Sl. No. 23 & 24)

15. COURSE CODE & COURSE NUMBERING SCHEME:

The subject codes will be given by the department teaching the subject. Each subject code contains 8 characters. The 8 characters for each subject will be filled as per the following guidelines.



16. GRADING SYSTEM:

16.1 Award of Grade:

(i) Semester Grade Point Average (SGPA):

a) The Semester Grade Point Average (SGPA) will be calculated according to the formula

$$\text{SGPA (Si)} = \frac{\sum C_i G_i}{\sum C_i}$$

Where C_i = number of credits for the subject i

G_i = grade points obtained by the student in the subject.

b) To arrive at Cumulative Grade Point Average (CGPA), the formula is used considering the student's performance in all the courses taken in all the semesters completed up to the particular point of time.

$$\text{CGPA} = \frac{\sum C_i S_i}{\sum C_i}$$

Where 'Si' is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester

i. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

ii. Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

iii. Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters A+, A, B, C, D, E and F.

iv. Equivalent Percentage = (CGPA – 0.75) x 10

(ii) After a student satisfies the requirements prescribed for the award of B.Tech Programme he/she shall be placed in one of the following four grades. The award of the degree is based on CGPA on a grade point scale of 10 and given in Table 9.

Table -9

CGPA	Award of Division
≥7.75	First Class with Distinction (Without any supplementary appearance)
≥ 6.75 <7.75	First Class
≥ 5.75 <6.75	Second Class
≥ 5.00<5.75	Pass Class

16.2 Award of Grade in Each Semester:

(i) Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester for each subject. The letter grades and the corresponding grade points are as given in the Table 10.

Table -10

Percentage of Marks Scored	Letter Grade	Level	Grade Points
>=90	A+	Outstanding	10
80 - 89	A	Excellent	9
70-79	B	Very Good	8
60-69	C	Good	7
50-59	D	Fair	6
40-49	E	Satisfactory	5
<40	F	Fail	0
	AB	Absent	0

(ii) A student earns a minimum of 5 grade points in a subject is declared to have successfully completed the subject, and is deemed to have earned the credits assigned to that subject. However, it should be noted that a pass in any subject/Internship/project/ shall be governed by the rules mentioned in **S. No. 13**.

(iii) Grade Sheet: A grade sheet (memorandum) will be issued to each student indicating his/her performance in all courses taken in that semester and also indicating the grades.

(iv) Transcripts: After successful completion of the programme of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued up to any point of study to the student on request and by paying stipulated fee in force.

(v) Candidates shall be permitted to apply for revaluation within the stipulated period with payment of prescribed fee.

(vi) The Academic Council has to approve and recommend to the JNTUK, Kakinada for the award of a degree to any student.

17. ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME):

i. The students have to acquire 121 credits from 3rd Semester to 8th Semester of Program (regular) for the award of the degree.

ii. Students, who fail to fulfill the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.

iii. The same attendance regulations are to be adopted as per the rules mentioned in item No.9.

iv. **Rules for Promotion in to Next Higher Class:** (6th Semester to 7th Semester): A student shall be promoted from 6th Semester to 7th Semester only if he/she fulfills the academic requirements of 40% credits up to either 5th or 6th Semester.

18. SUPPLEMENTARY EXAMINATIONS:

In addition to the Regular Final Examinations held at the end of each semester, a Supplementary Examination will be conducted. A student can appear for any number

courses of supplementary examinations till he/she clears the courses. However the maximum stipulated period of programme cannot be relaxed under any circumstance.

19. ADVANCED SUPPLEMENTARY EXAMINATIONS:

Candidate who fails the courses in 7th and 8th Semester can appear for Advanced Supplementary Examinations.

20. ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME):

i. The students have to acquire 121 credits from 3rd Semester to 8th Semester of B. Tech Programme for the award of the degree.
ii. All mandatory courses must be completed with satisfactory for award of degree.
iii. Obtained CGPA greater than or equal to 4.5 (minimum requirements for pass).
iv. The same attendance regulations are to be adopted as per the rules mentioned in item No.09.
v. **Rules for Promotion from 6th Semester to 7th Semester**: A student shall be promoted from 6th Semester to 7th Semester only if he/she fulfills the academic requirements of 40% credits up to 6th Semester.
vi. Students, who fail to fulfill the requirement for the award of the degree in six consecutive academic years from the year of admission, shall forfeit their seat.

21. CONDUCT AND DISCIPLINE:

Students admitted in SCET are to be followed the conduct and discipline of the college and which will be updated from time to time.

22. MALPRACTICES:

If any malpractices held in internal assessment tests or Semester-End Examinations, Principal constitute a Malpractice Enquiry Committee to enquire the case. The principal shall take necessary action based on the recommendations of the committee as per stipulated norms.

23. WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the institution or if any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.

24. HONORS PROGRAMME:

a) Students of a Department/Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline.

b) A student shall be permitted to register for Honors program at the beginning of 4th semester provided that the student must have acquired a minimum of 7.75 CGPA up to the end of 2nd semester without any backlogs. In case of the declaration of the 3rd semester results after the commencement of the 4th semester and if a student fails to score the required minimum of 8 CGPA, his/her registration for Honors Programme stands cancelled and he/she shall continue with the regular Programme.

c) Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an honors degree in the same. e.g. If a Mechanical

Engineering student completes the selected advanced courses from same branch under this scheme, he/she will be awarded B.Tech. (Honors) in Mechanical Engineering.

d) In addition to fulfilling all the requisites of a Regular B.Tech Programme, a student shall earn 20 additional credits to be eligible for the award of B. Tech (Honors) degree. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).

e) Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pools, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12 weeks as recommended by the Board of studies.

f) It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. The courses offered in each pool shall be domain specific courses and advanced courses.

g) The concerned BoS shall decide on the minimum enrolments for offering Honors program by the department. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.

h) Each pool can have theory as well as laboratory courses. If a course comes with a lab component, that component has to be cleared separately. The concerned BoS shall explore the possibility of introducing virtual labs for such courses with lab component.

i) If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Honors will be shown in the transcript. None of the courses done under the dropped Honors will be shown in the transcript.

j) In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors and they will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

k) Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor's degree.

25. MINOR PROGRAMME:

a) **i)** Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, If Mechanical Engineering student selects subjects from Civil Engineering under this scheme; he/she will get Major degree of Mechanical Engineering with minor degree of Civil Engineering

ii) Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, for example, a B.Tech Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.

b) The BOS concerned shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance / demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE, CE, ME etc or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric vehicles, VLSI etc.

c) The concerned BoS shall decide on the minimum enrolments for offering Minor program by the department. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.

d) A student shall be permitted to register for Minors program at the beginning of 4^{th} semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 7.75 CGPA (Cumulative Grade Point Average) up to the end of 2^{nd} semester without any history of backlogs. It is expected that the 3^{rd} semester results may be announced after the commencement of the 4^{th} semester. If a student fails to acquire 7.75 CGPA up to 3^{rd} semester or failed in any of the courses, his registration for Minors program shall stand cancelled. A CGPA of 7.75 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.

e) A student shall earn additional 20 credits in the specified area to be eligible for the award of B. Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).

f) Out of the 20 Credits, 16 credits shall be earned by undergoing specified courses listed by the concerned BoS along with prerequisites. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. If a course comes with a lab component, that component has to be cleared separately. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.

g) In addition to the 16 credits, students must pursue at least 2 courses through MOOCs. The courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned as decided by the university/academic council.

h) Student can opt for the Industry relevant minor specialization as approved by the concerned departmental BoS. Student can opt the courses from Skill Development Corporation (APSSDC) or can opt the courses from an external agency recommended and approved by concerned BOS and should produce course completion certificate. The Board of studies of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skills based on industrial demand.

i) College Academic committee evaluates the grades/marks given by external agencies to a student which are approved by concerned BoS. Upon completion of courses the departmental committee should convert the obtained grades/marks to the maximum marks assigned to that course. The controller of examinations can take a decision on such conversions and may give appropriate grades.

j) If a student drops (or terminated) from the Minor program, they cannot convert the earned credits into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may

choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.

k) In case a student fails to meet the CGPA requirement for B.Tech degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for degree with Minors and they will receive B. Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
l) Minor must be completed simultaneously with a major degree program. A student cannot earn the Minor after he/she has already earned bachelor's degree.

26. <u>GENERAL:</u>

a) Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
b) The academic regulation should be read as a whole for the purpose of any interpretation.
c) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final and which is to be ratified by the Chairman of the Governing Body.
d) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

SEMESTER-I

S.No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	20MA1T01	Linear Algebra	3	-	-	3	30	70	100
2	20BS1T01	Engineering Physics	3	-	-	3	30	70	100
3	20HS1T01	English	3	-	-	3	30	70	100
4	20CS1T01	Problem Solving Using C Programming	3	-	-	3	30	70	100
5	20BS1L01	Engineering Physics Lab	-	-	3	1.5	30	70	100
6	20HS1L01	English Proficiency Lab	-	-	3	1.5	30	70	100
7	20CS1L01	C Programming Lab	-	-	3	1.5	30	70	100
8	20IT1L01	IT Work shop	-	-	3	1.5	30	70	100
		Total	**12**	**-**	**12**	**18**	**240**	**560**	**800**

SEMESTER-II

S.No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	20MA2T02	Differential Equations and Numerical Methods	3	-	-	3	30	70	100
2	20BS2T02	Engineering Chemistry	3	-	-	3	30	70	100
3	20CS2T03	Object Oriented Programming with Python	3	-	-	3	30	70	100
4	20IT2T01	IT Essentials	2	1	-	3	30	70	100
5	20EE2T01	Basic Electrical and Electronics Engineering	3	-	-	3	30	70	100
6	20CS2L03	Object Oriented Programming Lab with Python	-	-	3	1.5	30	70	100
7	20EE2L01	Basic Electrical and Electronics Engineering Lab	-	-	3	1.5	30	70	100
8	20BS2L02	Engineering Chemistry Lab	-	-	3	1.5	30	70	100
9	20HS2L02	English Communication Lab	-	-	3	1.5	30	70	100
		Total	**14**	**1**	**12**	**21**	**270**	**630**	**900**

L-LECTURE HOURS, **T**- TUTORIAL HOURS, **P**-PRACTICAL HOURS, **C**-CREDITS,
IM- INTERNAL MARKS, **EM**- EXTERNAL MARKS, **TM**- TOTAL MARKS

SEMESTER-III

S.No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	20IT3T01	Discrete Mathematics	3	-	-	3	30	70	100
2	20BM3T01	Managerial Economics and Financial Analysis	3	-	-	3	30	70	100
3	20IT3T02	Computer Organization	3	-	-	3	30	70	100
4	20CS3T01	Data Structures	3	-	-	3	30	70	100
5	20IT3T03	Java Programming	3	-	-	3	30	70	100
6	20CS3L01	Data Structures Lab	-	-	3	1.5	30	70	100
7	20IT3L01	Computer Organization Lab	-	-	3	1.5	30	70	100
8	20IT3L02	Java Programming Lab	-	-	3	1.5	30	70	100
9	20CE3M01	Environmental Science	1	-	-	-	-	-	-
10	20IT3S01	Data Analysis and Visualization Lab	1	-	2	2	30	70	100
		Total	**17**	**0**	**11**	**21.5**	**270**	**630**	**900**

SEMESTER-IV

S.No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	20MA4T07	Probability & Statistics	3	0	0	3	30	70	100
2	20CS4T01	Operating Systems	3	0	0	3	30	70	100
3	20IT4T03	Data Base Management Systems	3	0	0	3	30	70	100
4	20CC4T01	Automata Theory and Compiler Design	3	0	0	3	30	70	100
5	20CC4T02	Fundamentals of Cyber Security	3	0	0	3	30	70	100
6	20IT4L03	Operating Systems Lab in Linux	0	0	3	1.5	30	70	100
7	20IT4L02	Data Base Management Systems Lab	0	0	3	1.5	30	70	100
8	20CC4L01	Cyber Security Lab	0	0	3	1.5	30	70	100
9	20BM4M01	Indian Constitution	1	-	-	-	-	-	-
10	20CC4S01	Full Stack Development Lab	1	0	2	2	30	70	100
11	20CC4C01	Community Service Project	0	0	0	4	100	0	100
		Total	**17**	**0**	**11**	**25.5**	**370**	**630**	**1000**

L-LECTURE HOURS, **T**- TUTORIAL HOURS, **P**-PRACTICAL HOURS, **C**-CREDITS,
IM- INTERNAL MARKS, **EM**- EXTERNAL MARKS, **TM**- TOTAL MARKS

SEMESTER-V

S.No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	20CS5T01	Computer Networks	3	0	0	3	30	70	100
2	20IT5T02	Artificial Intelligence	3	0	0	3	30	70	100
3	20CC5T01	Internet of Things	3	0	0	3	30	70	100
4		**Professional Elective-I**	3	0	0	3	30	70	100
5		**Open Elective-I/Job Oriented Elective-I**	3	0	0	3	30	70	100
6	20CC5L01	Artificial Intelligence Lab	0	0	3	1.5	30	70	100
7	20CC5L02	Internet of Things Lab	0	0	3	1.5	30	70	100
8	20BM5M01	Essence of Indian Traditional Knowledge	2	0	0	0	-	-	-
9	20HS5S01	Advanced Communication Skills Lab	1	0	2	2	30	70	100
10	20CC5I01	Internship -1	0	0	0	1.5	50	-	50
		Total	18	0	8	21.5	290	560	850

SEMESTER-VI

S.No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	20CC6T01	Cryptography and Network Security	3	0	0	3	30	70	100
2	20IT6T01	Machine Learning	3	0	0	3	30	70	100
3	20CC6T02	Cyber Crime Investigation & Digital Forensics	3	0	0	3	30	70	100
4		**Professional Elective-II/NPTEL**	3	0	0	3	30	70	100
5		**Open Elective-II/Job Oriented Elective-II**	3	0	0	3	30	70	100
6	20CC6L01	Cryptography and Network Security Lab	0	1	2	1.5	30	70	100
7	20IT6L01	Machine Learning Lab	0	0	3	1.5	30	70	100
8	20CC6L02	Cyber Crime Investigation & Digital Forensics Lab	0	0	3	1.5	30	70	100
9	20BM6M01	Professional Ethics and Intellectual Property Rights	2	0	0	0	-	-	-
10	20CC6S01	Skill Course-4 (Advanced Level) Android Programming Lab	1	0	2	2	30	70	100
		Total	18	1	10	21.5	270	630	900

SEMESTER-VII (Tentative)

S.No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	Theory	**Professional Elective-III**	3	0	0	3	30	70	100
2	Theory	**Professional Elective-IV**	3	0	0	3	30	70	100
3	Theory	**Professional Elective-V**	3	0	0	3	30	70	100
4	Theory	**Open Elective-III/ Job Oriented Elective-III**	3	0	0	3	30	70	100
5	Theory	**Open Elective-IV/ Job Oriented Elective-IV**	3	0	0	3	30	70	100
6	MC	Universal Human Values 2 – Understanding Harmony	3	0	0	3	30	70	100
7	SOC	**Skill Course-5 (Advanced Level)** Cyber Security Tools Lab	1	0	2	2	30	70	100
8		Internship (after 3rd year) Minimum 6 weeks	0	0	0	3	50	-	50
		Total	19	0	2	23	260	490	750

SEMESTER-VIII (Tentative)

S.No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	Project	Project (Project work, seminar and internship in industry)	0	0	0	8	60	140	200
		Total	0	0	0	8	60	140	200

L-LECTURE HOURS, **T**- TUTORIAL HOURS, **P**-PRACTICAL HOURS, **C**-CREDITS,
IM- INTERNAL MARKS, **EM**- EXTERNAL MARKS, **TM**- TOTAL MARKS.

PROFESSIONAL ELECTIVE – I :: V SEMESTER

S. No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	20CC5E01	Cyber Laws and Security Policies	3	-	-	3	30	70	100
2	20CC5E02	Social Networks and Semantic Web	3	-	-	3	30	70	100
3	20IT5E02	Software Project Management	3	-	-	3	30	70	100
4	20CC5E03	Object Oriented Software Engineering	3	-	-	3	30	70	100

OPEN ELECTIVE – I :: V SEMESTER

S. No	Course Code	Course Title	Offering Dept.
1	20EE5O01	Non-conventional Energy sources	EEE
2	20ME5O01	Waste to Energy Conversion	ME
3	20CS5O01	Internet of Things and Applications	CSE
4	20CS5O02	Data Engineering	CSE
5	20BM5O01	Innovations and Entrepreneurship	MBA
6	20BM5O03	Digital Marketing	MBA
7	20BM5O04	Business Environment	MBA
8	20IT5J01	Linux Administration	IT
9	20CS5J01	Full Stack with JAVA	CSE

JOB ORIENTED ELECTIVE – I :: V SEMESTER

S. No	Course Code	Course Title	Offering Dept.
1	20IT5J01	Linux Administration	IT
2	20CC5J01	R Programming	CSE(CS)

PROFESSIONAL ELECTIVE – II :: VI SEMESTER

S. No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	20CC6E01	Data Privacy	3	-	-	3	30	70	100
2	20CC6E02	Intrusion Detection and Prevention System	3	-	-	3	30	70	100
3	20IT6E01	Design Analysis of Algorithms	3	-	-	3	30	70	100
4	20CC6E03	Computer Vision	3	-	-	3	30	70	100

OPEN ELECTIVE – II :: VI SEMESTER

S. No	Course Code	Course Title	Offering Dept.
1	20CE6O01	Environmental Pollution and Control	CE
2	20CE6O02	Disaster Management	CE
3	20EE6O01	Fundamentals of Electrical Vehicle	EEE
4	20EC6O01	Mobile Communication and its Applications	ECE
5	20ME6O01	Basics of 3D Printing	MECH
6	20ME6O02	Farm Machinery	MECH
7	20CS6O01	Fundamentals of Software Engineering	CSE
8	20CS6O02	Fundamentals of Computer Networks	CSE
9	20BM6O01	Stress and Work Life Management	MBA
10	20BM6O02	Banking and Insurance	MBA
11	20MA6O01	Operation Research	S&H
12	20IT6O01	Introduction to Cloud Computing	IT
13	20IT6O02	E-Commerce	IT

JOB ORIENTED ELECTIVE - II :: VI SEMESTER

S. No	Course Code	Course Title	Offering Dept.
1	20CC6J01	Cloud Security	CSE(CS)
2	20IT6J02	Block Chain Technology	IT

PROFESSIONAL ELECTIVE – III :: VII SEMESTER									
1		Malware Analysis and Reverse Engineering	3	-	-	3	30	70	100
2		Information Coding Techniques	3	-	-	3	30	70	100
3		Big Data Analytics	3	-	-	3	30	70	100
4		Deep Learning	3	-	-	3	30	70	100
PROFESSIONAL ELECTIVE – IV :: VII SEMESTER									
1		Ethical Hacking	3	-	-	3	30	70	100
2		Critical Thinking & Intelligence	3	-	-	3	30	70	100
3		Vulnerability Assessment and Penetration Testing	3	-	-	3	30	70	100
4		Distributed Systems	3	-	-	3	30	70	100
PROFESSIONAL ELECTIVE – V :: VII SEMESTER									
1		Adhoc and Sensor Networks	3	-	-	3	30	70	100
2		Mobile and Wireless Security	3	-	-	3	30	70	100
3		Advanced Computer Networks	3	-	-	3	30	70	100
4		No SQL Databases	3	-	-	3	30	70	100

JOB ORIENTED ELECTIVE – III :: VII SEMESTER									
1		Data Science	3	-	-	3	30	70	100
2		Mobile Application Development	3	-	-	3	30	70	100
JOB ORIENTED ELECTIVE – IV :: VII SEMESTER									
1		DevOps	3	-	-	3	30	70	100
2		AWS	3	-	-	3	30	70	100

I SEMESTER	L	T	P	C
	3	-	-	3
20MA1T01: LINEAR ALGEBRA				

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- This course equips the students with standard concepts and tools an intermediate level to advanced level and to develop the confidence; ability to handle various real world problems and their applications.

Bridge Course: Limits, continuity, Types of matrices

Course Outcomes:

At the end of the course, the student will be able to

1. Develop the use of matrix algebra techniques that is needed by engineers for practical applications (K3)
2. Familiarize with functions of several variables which is useful in optimization (K3)
3. Learn important tools of calculus in higher dimensions. Students will become familiar with double integral(K3)
4. Familiarize with triple integral and also learn the utilization of special functions.(K4)

Unit I: Matrix Operations and Solving Systems of Linear Equations

Rank of a matrix by Echelon form, Normal form - solving system of homogeneous and non-homogeneous linear equations- Gauss Elimination, Jacobi and Gauss Seidel methods

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve system of linear equations. (K2)
- Determine the rank of a matrix. (K2)

Unit II:Eigen values and Eigen vectors

Eigen values and Eigen vectors - and their properties (without proof). Cayley - Hamilton theorem (without proof), Finding inverse and powers of a matrix by Cayley - Hamilton theorem - Reduction of a matrix to diagonal form.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find eigen values and eigen vectors of a matrix. (K2)
- Find inverse and powers of a matrix by Cayley-Hamilton theorem.(K2)

Unit III: Quadratic forms

Quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Reduce a matrix to diagonal form and identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (K3)

Unit IV: Multivariable calculus

Expansions of functions: Taylor's and Maclaurin's series- Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Expand the given function as Taylor's and Maclaurin's series.(K3)
- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way in which a function varies. (K3)
- Acquire the knowledge in maxima and minima of functions of several variables (K1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (K3)

Unit V: Multiple Integrals

Double Integrals: Change of order of integration, double integrals in polar coordinates, areas enclosed by plane curves.

Triple Integrals: Evaluation of triple integrals, change of variables.

Learning Outcomes:

At the end of this unit, the student will be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates.(K3)
- Apply double integration techniques in evaluating areas bounded by a region.(K4)

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 43/e, Khanna Publishers, 2015.

References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2013.
2. B.V. RAMANA, Higher Engineering Mathematics, Tata McGraw Hill, 2007.

I SEMESTER	L	T	P	C
	3	-	3	3
20BS1T01: ENGINEERING PHYSICS				

COURSE OUTCOMES

After completion of course student able to:

1. Describe Basic crystal systems and determination of crystal structures
2. Explain Magnetic and Dielectric Materials properties
3. Describe Concept of Magnetic Induction and Super Conducting properties
4. Explain Pure &Doped Semiconductor materials for better utility
5. Describe Optical fibers and Optical properties of materials and their applications

SYLLABUS

UNIT –I: CRYSTAL STRUCTURE AND X-RAY DIFFRACTION

CRYSTAL STRUCTURE:
Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC, BCC and FCC.

X-RAY DIFFRACTION:
Directions in crystals- planes in crystals- Miller indices and procedure to find Miller indices- Various planes in crystals- Separation between successive (h k l) planes-Bragg's law-Bragg's Spectrometer.

Learning Outcomes: At the end of this unit, the students will be able to

- **Explain** the seven crystal systems
- **Interpret** the crystal structure based on Bragg's law

UNIT – II: MAGNETIC AND DIELECTRIC PROPERTIES

MAGNETIC PROPERTIES: Introduction-Magnetic permeability – Magnetization – Relation between three magnetic vectors - Origin of magnetic moment – Classification of Magnetic materials-Dia, Para, Ferro, Anti-Ferro and Ferri-magnetism – Hysteresis- soft and Hard Magnetic materials.

DIELECTRIC PROPERTIES: Introduction-Dielectric constant- Relation between three electric vectors-Electronic and ionic polarizations (Quantitative) - orientation polarization(Qualitative) - Internal fields in solids- Clausius-Mossotti equation.

Learning Outcomes: At the end of this unit, the students will be able to

- **Classify** the magnetic materials into dia, para, ferro, anti ferro and ferri
- **Explain** the importance of hysteresis
- **Explain** the concept of polarization in dielectric materials.
- **Summarize** various types of polarization of dielectrics .
- **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics.

UNIT-III: ELECTROMAGNETIC WAVES AND SUPERCONDUCTIVITY

ELECTROMAGNETIC WAVES: Introduction-Electric flux –magnetic flux- Gauss law in electrostatics- Gauss law in magnetostatics- Ampere's law-B for a Solenoid - Biot-Savart's law-Magnetic Induction due to current carrying circular loop- Faraday's law - Maxwell's equations (Integral and differential forms).

SUPERCONDUCTIVITY: General and Thermal properties –Meissner effect – Type-I and Type-II superconductors – Flux quantization –BCS Theory of Superconductivity - Josephson effects – Applications of Superconductors.

Learning Outcomes: At the end of this unit, the students will be able to

- **Illustrate** the concept of electro magnetism based on fundamental laws of electro magnetism
- **Explain** Maxwell's equations
- **Summarize** various properties and applications of superconductors

UNIT-IV: PHYSICS OF SEMICONDUCTORS:

Classification of solids based on band theory - Intrinsic semiconductors- density of charge carriers- Equation for conductivity – Extrinsic semiconductors- P-type and N-type- density of charge carriers- Drift and diffusion – Einstein's equation – Hall Effect- Hall coefficient – Applications of Hall effect– direct & indirect band gap semiconductors.

Learning Outcomes: At the end of this unit, the students will be able to

- **Summarize** various types of solids based on band theory.
- **Outline** the properties of n-type and p-type semiconductors.
- **Identify** the type of semiconductor using Hall effect

UNIT-V: LASERS AND OPTICAL FIBERS

LASERS: Introduction– Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion - Three level and four level laser pumping schemes - Ruby laser – Helium-Neon laser- Applications of Laser.

FIBER OPTICS: Introduction to Optical fibers- Critical angle of propagation- Total internal reflection-Acceptance angle and acceptance cone- Numerical aperture- Classification of optical fibers based on refractive index profile-Classification of optical fibers based on modes- Attenuation in optical fibers - Applications of optical fibers.

Learning Outcomes: At the end of this unit, the students will be able to

- **Design** various types of lasers
- **Explain** the principle and propagation of light through Optical fibers
- **Discuss** the application of lasers and Optical fibers

I SEMESTER	L	T	P	C
	3	-	-	3
20HS1T01: ENGLISH				

A. PROGRAMMECONTENT

1 Intensive and extensive reading
2 Written communication
3 Listening and oral communication
4 Vocabulary consolidation and expansion
5 Practicing grammar

B. ELABORATIONOF THEPROGRAMMECONTENT

1. Intensive and Extensive Reading

a. Identifying the main theme/the central idea of a passage
b. Understanding the meaning of words, phrases and sentences in context
c. Understanding the logical relationship between sentences (through recognition of grammatical structures such as linkers and connectors)
d. Distinguishing statements of fact from beliefs, opinions, hypotheses, and expressions of probability and certainty
e. Inferring facts, opinions, instances, reasons, causes, results, requests, conclusions, and general statements
f. Skimming passages to identify general ideas and information
g. Scanning passages to locate specific detail
h. The use of one's knowledge, opinions and imagination to provide information/ situations related to that given in the text; and comparison and contrast.

2. Written Communication

a. Writing outlines and summaries
b. Writing paragraphs with attention to topic sentences and supporting sentences
c. Writing paragraphs with attention to coherence and cohesion
d. Practicing clutter-free writing

3. Listening and Oral Communication

a. Effective listening involving

- Identification of keywords and phrases and specific information, application of one's previous knowledge of to understand the ideas dealt with in the text being list end to.
- Attention to communication strategies such as approaching a other person and opening a conversation with him/her, making friends with a stranger, thanking, apologizing, paying a compliment, seeking clarification, making enquiries, and creating an appropriate context for a formal discussion.

b. Taking part in speaking activities for interactional purposes such as,

- Introducing oneself to others, introducing others, making enquiries, seeking information
- Responding to enquiries, supplying information
- Expressing agreement/disagreement in information situations

c. Taking part in speaking activities for transactional purposes with attention to the communication strategies listed in 1(a) above.

4. Vocabulary consolidation and expansion

a. Inferring word meaning from available clues
b. Distinguishing words with similar meanings
c. Using connecting words
d. Learning one-word substitutes

Developing a verbal repertoire with the following dimensions:

- Contexts of use
- Collocations
- Differences in speaking and writing
- Strategic use

e. Using strategic vocabulary to organize and manage both oral and written communication successfully in academic, professional, and social contexts

f. Raising one's knowledge of redundancy, circumlocution, and imprecise and confusing expressions in order to avoid the min one's own speech and writing.

5. Practicing grammar

a. Consolidation as well as remediation in the following areas:
Parts of speech, Tenses and usage of grammar in context
b. Learning to avoid some of the common pit falls in the area of grammar in Indian usage of English(e.g. using the present continuous tense to describe actions which happen regularly; using state verbs in the continuous form; tense mixing)

C.TEXT BOOK: Building Effective Communication Skills

By Maruthi Publications (2019)

Syllabus :

S No	Content
UNIT –I	**Vocabulary Building** **1.1** Video Lesson 1.2.1 Word formation 1.2.2. Root words 1.2.3. Prefixes and Suffixes 1.2.4. Synonyms and Antonyms **1.3 Parts of Speech** **1.4 Note- making, Note-taking**
UNIT –II	**Basic Writing Skills** **2.1** Video Lesson 2.2.1 Basic sentence structure 2.2.2. Clauses and Phrases 2.2.3 Punctuations 2.2.4 Creating coherence 2.2.5 Organizing principles of paragraph documents 2.2.6 Techniques for writing precisely **2.3 Tenses** **2.4 Letter Writing**
UNIT-III	**Identifying Common Errors in Writing** **3.1** Video Lesson 3.2.1 Sub +verb agreement 3.2.2 Noun pronoun agreement 3.2.3 Articles

	3.2.4 Preposition 3.2.5 Redundancies 3.2.6 Clichés **3.3.1 Active - Passive Voice** **3.3.2 Reported Speech** **3.4 Resume Writing**
UNIT-IV	**Nature and Style of sensible Writing** **4.1** Video Lesson 4.2.1 Describing 4.2.2 Classifying 4.2.3 Writing Introduction and conclusion **4.3.1Conditional Sentences** **4.3.2Degrees of Comparison** **4.4 Email writing**
UNIT-V	**Writing Practice** **5.1** Video Lesson 5.2.1 Comprehension 5.2.2 Precise writing 5.2.3 Essay Writing **5.3Simple Compound and Complex Sentences** **5.4 Report Writing**

I SEMESTER	L	T	P	C
	3	-	-	3
20CS1T01: PROBLEM SOLVING USING C PROGRAMMING				

COURSE OUTCOMES

At the end of the course, student will be able to

CO1: Analyse a computational problem and develop an algorithm/flowchart to find its solution **(K2)**

CO2: Develop C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or bitwise operators **(K3)**

CO3: Divide a given computational problem into a number of modules and develop C program with arrays(K3)

CO4: Write C programs which use pointers for array processing and parameter passing **(K3)**

CO5: Develop C programs with structure or union and files for storing the data to be processed. **(K3)**

UNIT-I **Contact Hours : 10**

INTRODUCTION TO PROGRAMMING : What is computer, Block diagram of Computer, Development of Computer languages, Translators, Computer Codes, Computer Arithmetic, Programming Techniques, Algorithm, Flowchart

BASICS OF C : History of C, Character Set, Identifiers, Keywords, Tokens, Variables, constants, operators, Data types, expressions, expression evaluation, operator precedence and associativity, typecasting C program structure.

Contact Hours : 8

UNIT-II

CONSOLE I/O OPERATIONS : Formatted I/O - printf& scanf, Unformatted I/O functions.

CONTROL FLOW STATEMENTS: Branching Statements - if, if – else, switch. **Looping statements**- while, do – while, for, nested for. **Unconditional Statements -** break, continue, goto, exit.

Contact Hours : 12

UNIT-III

ARRAYS : Array declaration , initialization and Accessing, Types of Arrays : 1-D and 2-D Arrays, Arrays as Function Arguments

FUNCTIONS: Introduction to Functions, Types of Function, Function prototypes, parameter passing techniques, Scope of variables, Storage classes, Recursion

Contact Hours : 8

UNIT-IV

STRINGS: Reading String from terminal, Writing string to Screen, String Handling Functions.

POINTERS: Pointer Declaration, Initialization and Accessing , Types of Pointers, Pointer Arithmetic, Dynamic memory allocation

Contact Hours : 10

UNIT-V

STRUCTURE : Introduction to structures, Definition of structure , declaration of structure variable, accessing of structure members, array of structures, **Union, enum, bit fileds, typedef**

FILES : Introduction to Files, Types of File, File Modes, Writing and Reading Files, File management I/O functions

Text books

Programming in ANSI C by E. Balguruswamy, Tata Mc-Graw Hill

- Programming With C, Schaum Series

Reference Books

- The 'C' programming language by Kernighan and Ritchie, Prentice Hall
- Computer Programming in 'C' by V. Rajaraman , Prentice Hall
- Programming and Problem Solving by M. Sprankle, Pearson Education
- How to solve it by Computer by R.G. Dromey, Pearson Education

Online Practice and Reference Material

http://www2.its.strath.ac.uk/courses/c/

http://www.princeton.edu/~achaney/tmve/wiki100k/docs/C_%28programming_language%29.html

http://www.stat.cmu.edu/~hseltman/Computer.html

http://projecteuler.net/

I SEMESTER	L	T	P	C
	-	-	3	1.5
20BS1L01: ENGINEERING PHYSICS LAB				

COURSE OUTCOMES

At the end of the course, student will be able to

CO1: Demonstrate the basic knowledge to know the frequency of a vibrator, hall coefficient, (K3)

CO2: Attain knowledge to verify some of the properties of physical optics. (K4)

CO3: Develop skills to plot various characteristic curves and to calculate the physical properties of given materials. (K4)

CO4: Calculate some the properties of semiconducting materials. (K2)

STUDENT HAS TO DO ANY TEN OF THE FOLLOWING

1. Determination of wavelength of Laser using diffraction grating.
2. Determination of Numerical Aperture and Acceptance angle of an Optical Fiber.
3. Determination of the charge carrier density by using Hall Effect.
4. Determination of the Band Gap of a Semiconductor using a p-n junction diode.
5. Study of Characteristic curves (l/V) of a Zener diode to determine its Breakdown voltage.
6. Determination of Temperature coefficient of resistance of a Thermistor by using its Characteristic curve.
7. Study the variation of intensity of magnetic field along the axis of a circular current carrying coil by using Stewart and Gee's experiment.
8. Study of Characteristic curves (l/V) of a P-N diode.
9. Determine Frequency of given electrically driven tuning fork in Transverse and Longitudinal modes by using Melde's apparatus
10. Determine frequency of A.C. supply by using Sonometer.
11. Determination of the Time Constant for a C-R Circuit
12. Determination of the Planck's constant by using Photo-Cell
13. Determination of dielectric constant of a given material

I SEMESTER	L	T	P	C
	-	-	3	1.5
20HS1L01: ENGLISH PROFICIENCY LAB				

COURSE OBJECTIVES

- To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
- To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
- To assist students to carry on the tasks and activities through guided instructions and materials.
- To effectively integrate English language learning with employability skills and training.
- To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
- To provide hands-on experience through case-studies, mini-projects, group and individual presentations.

COURSE OUTCOMES

a) Reading Skills.

- Addressing explicit and implicit meaning of a text.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

b) Writing Skills:

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, E-Mails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

c) Interactive skills:

- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

d) Life Skills and Core Skills:

- Examining self-attributes and identifying areas that require improvement self-diagnosis, self-motivation.
- Adopting to a given situation and developing a functional approach to find solutions-adaptability, problem-solving.
- Understanding the importance of helping others-community service, enthusiasm.

RELATIONSHIP OF COURSE TO PROGRAMME OUTCOMES

A	Ability to apply knowledge of mathematics, science, and engineering.	
B	Ability to design and conduct experiments, as well as to analyze and interpret data.	
C	Ability to design an Engineering system, component, or process.	
D	Ability to function on multi-disciplinary teams	
E	Ability to identify, formulate and solve engineering problems.	
F	Understanding of professional and ethical responsibility.	
G	Ability to communicate effectively	√
H	Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.	√
I	Recognition of the need for and an ability to engage in life-long learning.	
J	Knowledge of contemporary issues.	
K	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practices.	
L	Ability to find location of substations and benefits derived through their optimal location.	

COURSE DESCRIPTION

Communicating in a language is also a skill. So a student has to look for an opportunity to practice English language in order to acquire proficiency in English. 'Enrich your interactive Skills: Part - A' is designed to provide opportunities for engineering students to revise and consolidate the basic skills in listening, speaking, reading and writing in addition to giving ample practice in various communicative functions and Life skills.

PRE REQUISITES

The student is expected to have basic knowledge in English language and must be able to write in English. He is also expected to possess fundamental knowledge of general English grammar and vocabulary.

Syllabus

Unit	TOPIC
1	Vowels, Consonants, Pronunciation, Phonetic transcripts
2	Word stress and syllables
3	Rhythm and Intonation
4	Contrastive Stress –Homographs
5	Word Stress : Weak and Strong forms , Stress in compound words

Text Book:

"InfoTech English" by Maruthi Publications

Reference Books:

1. Better English Pronunciation by O' Connor
2. Phonetics and Phonology – Peter Roach
3. A Grammar of Spoken English – Harold Palmer
4. English Phonetics – Bansal and Harrison

Testing Pattern:

A) Internal lab Exam:	**30 Marks**
Regular performance in the language /communication /lab completion in the lab manual	15M
Written test	15M
B) External lab Exam Pattern:	**70 Marks**
Written test	30M
Oral test	30M
Viva (during exam marks will be awarded by external examiner)	10M

I SEMESTER	L	T	P	C
	-	-	3	1.5
20CS1L01: C PROGRAMMING LAB				

Course Objectives:

- To impart knowledge on various Editors, Raptor.
- To make the students understand the concepts of C programming.
- To nurture the students on Control Structures and develop different operations on arrays.
- To make use of String fundamentals and modular programming constructs.
- To implement programs using dynamic memory allocation.
- To explain the concepts of Structure, Unions and files for solving various problems.

List of Experiments:

1. Introduction to Algorithms and Flowcharts

1.1) Implement Algorithm Development for Exchange the values of Two numbers.

1.2) Given a set of n student's examination marks (in the range 0-100) make a count of the number of students that passed the examination. A Pass is awarded for all of 50 and above.

1.3) Given a set of n numbers design an algorithm that adds these numbers and returns the resultant sum. Assume N is greater than or equal to zero.

2. Introduction to C Programming

2.1) Exposure to Turbo C, Code Blocks IDE, Dev C++, Falcon C++.

2.2) Writing simple programs using printf(), scanf() .

3. Raptor

3.1) Introduction to Raptor.

3.2) Draw a flow chart to find the Sum of 2 numbers.

3.3) Draw a flow chart to find Simple interest.

4. Basic Math

4.1) Write a C Program to convert Celsius to Fahrenheit and vice versa.

4.2) Write a C Program to find largest of three numbers using ternary operator.

4.3) Write a C Program to Calculate area of a Triangle using Heron's formula.

5. Control Flow- I

5.1) Write a C Program to Find Whether the Given Year is a Leap Year or not.

5.2)Write a C program to find the roots of a Quadratic Equation.

5.3) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using Switch…case.

6. Control Flow- II

6.1) Write a C Program to Find Whether the Given Number is Prime number or not.

6.2) Write a C Program to Find Whether the Given Number is Armstrong Number or not.

6.3) Write a C program to print Floyd Triangle.

7. Control Flow- III

7.1)Write a C program to find the sum of individual digits of a positive integer.

7.2) Write a C program to check whether given number is palindrome or not.

7.3) Write a C program to read two numbers, x and n, and then compute the sum of the geometric progression $1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$.

Practice Programs:

Write a C program to print all natural numbers from 1 to n. - using while loop

Write a C program to print all natural numbers in reverse (from n to 1). - using while loop

Write a C program to print all alphabets from a to z. - using while loop

Write a C program to print all even numbers between 1 to 100. - using while loop
Write a C program to print sum of all even numbers between 1 to n.
Write a C program to print sum of all odd numbers between 1 to n.
Write a C program to print table of any number.
Write a C program to find first and last digit of any number.
Write a C program to count number of digits in any number.
Write a C program to calculate sum of digits of any number.
Write a C program to calculate product of digits of any number.
Write a C program to swap first and last digits of any number.
Write a C program to enter any number and print its reverse.
Write a C program to enter any number and check whether the number is palindrome or not.
Write a C program to find frequency of each digit in a given integer.
Write a C program to enter any number and print it in words.
Write a C program to print all ASCII character with their values.
Write a C program to enter any number and print all factors of the number.
Write a C program to enter any number and calculate its factorial.
Write a C program to find HCF (GCD) of two numbers.
Write a C program to find LCM of two numbers.
Write a C program to check whether a number is Prime number or not.
Write a C program to check whether a number is Armstrong number or not.
Write a C program to check whether a number is Perfect number or not.
Write a C program to check whether a number is Strong number or not.
Write a C program to print Fibonacci series up to n terms.

8. Arrays

8.1) Write a C program to search an element in the given array (Linear Search).
8.2) Write a C program to perform matrix addition.
8.3) Write a C program to perform matrix multiplication.

Practice Programs:

Write a C program to read and print elements of array.
Write a C program to find sum of all array elements. - using recursion.
Write a C program to find maximum and minimum element in an array. - using recursion.
Write a C program to find second largest element in an array.
Write a C program to copy all elements from an array to another array.
Write a C program to insert an element in an array.
Write a C program to delete an element from an array at specified position.
Write a C program to print all unique elements in the array.
Write a C program to print all negative elements in an array.
Write a C program to count total number of even and odd elements in an array.
Write a C program to count total number of negative elements in an array.
Write a C program to count total number of duplicate elements in an array.
Write a C program to delete all duplicate elements from an array.
Write a C program to count frequency of each element in an array.
Write a C program to merge two array to third array.
Write a C program to find reverse of an array.
Write a C program to convert lowercase string to uppercase.
Write a C program to convert uppercase string to lowercase.
Write a C program to toggle case of each character of a string.

Write a C program to find total number of alphabets, digits or special character in a string.

9. Pointers

9.1) Write a C Program to Perform Addition, Subtraction, Multiplication and Division of two numbers using Command line arguments.

9.2)Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.

9.3) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

10. Functions, Array & Pointers

10.1) Write a C Program to demonstrate parameter passing in Functions.

10.2) Write a C Program to find Fibonacci, Factorial of a number with Recursion and without recursion.

10.3) Write a C Program to find the sum of given numbers with arrays and pointers.

Practice Programs:

Program to change the value of constant integer using pointers.

Program to print a string using pointer.

Program to count vowels and consonants in a string using pointer.

Program to read array elements and print with addresses.

11. Strings

11.1) Implementation of string manipulation operations with library function:

a) copy
b) concatenate
c) length
d) compare

11.2) Implementation of string manipulation operations without library function:

a) copy
b) concatenate
c) length
d) compare

11.3) Verify whether the given string is a palindrome or not.

12. Structures

12.1) Write a C Program to Store Information of a book Using Structure.

12.2) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function.

13. Files

13.1) Write a C program to open a file and to print the contents of the file on screen.

13.2) Write a C program to copy content of one file to another file.

13.3) Write a C program to merge two files and store content in another file.

14. Application

Creating structures to capture the student's details save them in file in proper record format, search and prints the student details requested by the user.

Note:Draw the flowcharts using Raptor from Experiment 3 to Experiment 6.

Course Outcomes:

- Implement basic programs in C and design flowcharts in Raptor.
- Use Conditional and Iterative statements to solve real time scenarios in C.

- Implement the concept of Arrays and Modularity and Strings.
- Apply the Dynamic Memory Allocation functions using pointers.
- Develop programs using structures, and Files.

Reference Books:

1. Let Us C YashwanthKanetkar, 16th edition, BPB Publications.
2. Programming in C A-Practial Approach Ajay Mittal. Pearson Education.
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
4. Problem solving using C , K Venugopal,3rdEdition,TMG Publication.

Web Links:

1. https://www.hackerrank.com/
2. https://www.codechef.com/
3. https://www.topcoder.com/
4. https://code-cracker.github.io/
5.https://raptor.martincarlisle.com/
6. https://nptel.ac.in/courses/106105085/2

I SEMESTER	L	T	P	C
	-	-	3	1.5
20IT1L01 : IT WORKSHOP				

Course Objectives:

1. The course focuses on enhancing student knowledge in computer peripherals and assembling.
2. To install operating system on computers and create new email account.
3. To understand basic software like WinRAR, WinZip, PDF readers and web browser.
4. To provide technical training to the students on Google tools like forms, calendar, drive, and classroom.

Course Outcomes:

Upon successful completion of the course, students will be able to
1. Attain complete knowledge of a computer hardware
2. Able to install basic computer engineering software.
3. Able to do document task through MS office.
4. Attain technically strong usage of Google Tools and Email handling.
5. Able to understand network troubleshooting.

LIST OF EXPERIMENTS

1. Components of Computer & Assembling a Computer:

Learning about the different parts of the computer and its advancement
- Processor
- Memory – Types
- Motherboard
- Peripheral interfaces – I/O devices

2. Components of Computer & Assembling a Computer:
- Learn about the proper connectivity among the devices inside the PC
- Assembling the different parts of the computer inside the cabinet

3. Productivity Tools - Learning Basic Software:
- Installation of Productivity tools like WinRAR, WinZip, and PDF Reader.
- Installation of Application programs like Microsoft Office, Image Editor and Web browsers.
- Connect the Printer and Scanner Devices perform printing and scanning operation.

4. Productivity Tools:

Microsoft-Word orientation –To create project certificate, Formatting Fonts, Drop Cap,Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option.

5. Productivity Tools:

Microsoft-Word orientation- Mail Merge, Macros, References.

6. Productivity Tools:

Microsoft-PowerPoint utilities - PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Hyperlinks, Inserting Images, Clip Art, Audio, Video, Objects, Tables and Charts.

7. Productivity Tools:

Microsoft-Excel orientation - Gridlines, Format Cells, Summation, auto fill, Formatting Text,Cell Referencing, Formulae in excel – average, std.deviation etc., Macros.

8. Productivity Tools:

Microsoft-Excel orientation- Charts, Hyper linking, Split cells, freeze panes, group and outline, Conditional formatting, Sort and Filter, .csv file.

9. **Introduction to Google Tools:**

- Design a Google form and collect a response data among students using Google Form.
- Schedule one day of your activities using Google Calendar.
- Store and retrieve data from cloud storage using Google Drive.
- Orientation towards Google Classroom.

10. **Network basics:**

Introduction, Types of networks, IP addressing, LAN, Network troubleshooting.

II SEMESTER	L	T	P	C
	3	-	-	3
20MA2T02 : DIFFERENTIAL EQUATIONS AND NUMERICAL METHODS				

Course Objectives:

- To enlighten the learners in the concept of differential equations.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

Unit I: Linear differential equations of higher order:

Solutions of Non-homogeneous equations of higher order with constant coefficients – with non-homogeneous terms of the type e^{ax}, sin ax, cos ax, polynomials in x^n, $e^{ax}V(x)$ and $x^nV(x)$ – Method of Variation of parameters.

Learning Outcomes:

At the end of this unit, the student will be able to

- identify the essential characteristics of linear differential equations with constant coefficients (K3)
- solve the linear differential equations with constant coefficients by appropriate method (K3)

Unit –II: Partial Differential Equations of First Order:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of first order linear (Lagrange) equations and nonlinear (standard types) equations.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply a range of techniques to find solutions of standard PDEs (K3)
- outline the basic properties of standard PDEs (K2)

Unit III: Interpolation

Finite differences, Differences of a polynomial, relation between operators, to find one or more missing terms, Newton's interpolation formulae, and interpolation with unequal intervals- Lagrange's formula.

Learning Outcomes:

After the completion of this unit student will be able to

- explain various discrete operators and find the relation among operators (K2)
- apply Newton's forward and backward formulas for equal and unequal intervals (K3)

Unit IV: Numerical Solution of Equations and Numerical integration

Numerical Solution of Equations: Solution of algebraic and transcendental equations - Bisection Method, Method of False Position, Newton-Raphson Method, useful deduction from Newton-Raphson Method.

Numerical Integration – Trapezoidal rule, Simpson's $\frac{1}{3}$ rule and Simpson's $\frac{3}{8}$ rule.

Learning Outcomes:

After the completion of this unit student will be able to

- find approximate roots of an equation by using different numerical methods (K3)
- find integral of a function by using different numerical methods (K3)

Unit V: Numerical Methods to Solve Ordinary Differential Equations

Numerical Methods to Solve Ordinary Differential Equations - Taylor's series, Euler's and modified Euler's methods, Runge-kutta method of fourth order for solving first order equations.

Learning Outcomes:

After the completion of this unit student will be able to

- solve ordinary differential equations by using different numerical schemes (K3)

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 43/e, Khanna publishers,2015.

References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2013.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008.

Course Outcomes:

At the end of the course, the student will be able to

1. solve the differential equations related to various engineering fields (K3)
2. identify solution methods of partial differential equations that model physical processes (K3)
3. evaluate the approximate roots of polynomial and transcendental equations by different algorithms(K3)
4. solve integrate and ordinary differential equations by various numerical techniques.(K3)

II SEMESTER	L	T	P	C
	3	-	-	3
20BS2T02: ENGINEERING CHEMISTRY				

COURSE OUTCOMES

At the end of semester, the students will be able to

CO1: Explain the impurities present in raw water, problems associated and how to avoid them (K2)

CO2: Explain the advantages of Polymers in daily life (K2)

CO3: Explain the theory of construction of battery and fuel cells and theories of corrosion and prevention methods. (K2)

CO4: Differentiate conventional and non-conventional energy sources and their advantages and disadvantages. (K2)

CO5: Identify the usage of advanced materials in day to day life (K2)

UNIT I: WATER TECHNOLOGY [9 Hours]

Part-A

Hard water-Types of hardness-Units of Hard Water-Disadvantages of hard water-Determination of hardness by EDTA complexometric method.

Portable water- its specifications-steps involved in purification of water (Sedimentation, Filtration, Disinfection)-chlorination, break point of chlorination.

Boiler Feed Water-Boiler troubles: Scale and sludge-priming and foaming-boiler corrosion-caustic embrittlement.

Part-B

Industrial Water Treatment: Softening methods: zeolite process-ion exchange process.
Brackish water treatment (desalination methods): Reverse osmosis - electro dialysis.

Learning Outcomes: At the end of this unit, the students will be able to Explain

The impurities present in raw water, problems associated with them and how to avoidthem

UNIT-II: POLYMERS AND COMPOSITE MATERIALS [9 Hours]

Part-A

Polymers-degree of polymerization-functionality-preparation, properties and applications of individual polymers-Bakelite-PVC-Poly styrene.

Plastics: Types (thermosetting and thermoplastic)-compounding of plastics-moulding Process. (Injection moulding, Compression moulding, Extrusion moulding, Transfer moulding)

Part-B

Rubbers and elastomers: Introduction-natural rubber-vulcanization of rubber-synthetic rubbers-Buna-N, Buna-S.

Composite materials: Fiber reinforced plastics-biodegradable polymers-biomedical polymers, Recycling of e-waste.

Learning Outcomes: At the end of this unit, the students will be able to

- **Outline** the properties of polymers and various additives added and different methods of forming plastic materials.
- **Explain** the preparation, properties and applications of some plastic materials.
- **Discuss** natural and synthetic rubbers and their applications.

UNIT III: ELECTRO CHEMICAL CELLS AND CORROSION [12 Hours]

Electrochemical Cells: Introduction–single electrode potential - electrochemical cell-electrochemical series and applications. Reference electrodes-standard hydrogen electrode and calomel electrode-construction of glass electrode. Batteries: Construction, working and cell reaction of primary (dry cell) and Secondary (Pb acid and Li-ion) battery. Fuel cells (H_2-O_2, Methanol-Air cells).

Corrosion: Cause and consequences of corrosion-theories of corrosion (Chemical and Electrochemical corrosion)-types of corrosion (Galvanic, Differential aeration (waterline and pitting corrosion), stress Corrosion). Factors influencing rate of corrosion-nature of metal-nature of corrosive atmosphere. Corrosion Prevention methods: Cathodic protection-Sacrificial anodic method-Impressed voltage method. Metallic coatings: Galvanization-Tinning-Electro plating-Electro less plating.

Learning Outcomes: At the end of this unit, the students will be able to

- **Explain** the theory of construction of battery and fuel cells.
- **Categorize** the reasons for corrosion and study some methods of corrosion control.

UNIT IV: CONVENTIONAL AND NONCONVENTIONAL ENERGY RESOURCES [9 Hours]

Conventional energy sources: Classification and characteristics of fuels-solid, Liquid and gaseous fuels-advantages and disadvantages-calorific value-higher and lower calorific values-construction and working of bomb calorimeter-analysis of coal-proximate and ultimate analysis-numerical problems related to bomb calorimeter, Dulong's formula and coal analysis-petroleum refining-cracking – petrol and diesel knocking – octane number and cetane number – gaseous fuels – Natural gas – CNG - LPG

Non-conventional energy sources: Solar energy: Advantages-disadvantages of solar cells-construction and working of photo voltaic cell -Introduction to hydro power-geo thermal power-tidal and wave power.

Learning Outcomes: At the end of this unit, the students will be able to

- **Differentiate** conventional and non-conventional energy sources and their advantages and disadvantages.
- **design** sources of energy by different natural sources

UNIT V: CHEMISTRY OF MATERIALS [9 Hours]

Part-A

Nano materials: Introduction-sol-gel method-characterization by SEM and TEM methods- carbon nanotubes and fullerenes: Types, preparation and applications

Semiconductors: Preparation (Distillation, Zone refining)

Part-B

Cement: Constituents of cement -Setting and Hardening of cement - Decay of Cement.

Refractories: Definition of refractory-classification and properties of refractoriness-applications of refractories.

Learning Outcomes: At the end of this unit, the students will be able to

- **Outline** the awareness of materials like nano materials and fullerenes and their uses.
- **Explain** the techniques that detect and measure the surface properties of materials.
- **Illustrate** the commonly used industrial materials.

Text Books:

T1. A Text Book of Engineering Chemistry -N. Y. S. Murthy, V. Anuradha& K. RamanaRao, Maruthi Publications. (2018)

T2. A Text Book of Engineering Chemistry - K. SeshaMaheswaramma, MridulaChugh, Pearson Publications (2018).

Reference Books:

R1. Engineering Chemistry – Jain & Jain, DhanpatRai Publishing Company (Latest Edition)

R2. Text Book of Engineering Chemistry - ShashiChawla, DhanpatRai& Co. (P) Limited ((Latest Edition))

R3. Chemistry –PrasantaRath, SubhenduChakroborthy, Cengage publications (2018)

II SEMESTER	L	T	P	C
	3	-	3	3
20CS2T03 : OBJECT ORIENTED PROGRAMMINGS WITH PYTHON				

Course Objectives:

1 Acquire programming skills in core Python.
2 Acquire Object-Oriented Programming features implementation in Python.
3 To understand data structures in Python
4 Develop the ability to use Operating System functions in python applications
5 Able to use exception handling in python programs

Course Outcomes:

CO1: Recognize core programming basics and program design with functions using Python programming language.
CO2: Interpret the high-performance programs designed to strengthen the practical expertise.
CO3: Develop applications for real time problems by applying python data structure concepts.
CO4: Understand and apply the concepts of packages, handling, multithreading and socket programming.
CO5: Analyze the importance of object-oriented programming over structured programming.

UNIT – I:

Introduction to Python: Features of Python, History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.
Data types: Integers, Strings, Booleans.

UNIT – II:

Operators and Expressions: Types - Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations
Control Flow: if, if-elif-else, for, while, break, continue, pass

UNIT – III:

Data Structures: Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.
Functions: Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

UNIT – IV:

Object Oriented Programming in Python: Classes, Data hiding, 'self-variable', Methods, Constructor, methods, and inheritance: Various Types of Inheritance and Function Overloading, Overriding Methods.

UNIT – V:

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions
Brief Tour of the StandardLibrary: Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times

Text Books:

1. Learning Python, Mark Lutz, Orielly
2. Python Programming: A Modern Approach, VamsiKurama, Pearson
3. R NageswaraRao, "Core Python Programming", Dream tech press, 2017 Edition
4. Dusty Philips, "Python 3 Object Oriented Programming", PACKT Publishing, 2nd Edition, 2015

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage
4. Michael H.Goldwasser, David Letscher, "Object Oriented Programming in Python", Prentice Hall, 1st Edition, 2007.

Web References:

1. https://realpython.com/python3-object-oriented-programming/
2. https://python.swaroopch.com/oop.html
3. https://python-textbok.readthedocs.io/en/1.0/Object_Oriented_Programming.html
4. https://www.programiz.com/python-programming

II SEMESTER	L	T	P	C
	3	-	-	3
20IT2T01: IT ESSENTIALS				

COURSEOUTCOMES:

After the completion of this course, students will be able to

1. Understand the concepts of operating systems.
2. Demonstrate the implementation of various software engineering tools.
3. Understand the basics of Internet.
4. Understand the orientation towards web basics.
5. Demonstrate the implementation of various computer graphics concepts.

Unit-1

Operating Systems: Introduction, Functions of an operating System, Classification of Operating Systems, System programs, Application programs, Utilities, Installation of Operating Systems, The Unix Operating System, Basic Unix commands.

Unit-2

Software Engineering: The evolving role of software, changing nature of software, software myths, Structure of Software Life Cycle, Software engineering methodologies, software requirements, various software engineering tools.

Unit-3

Internet Basics: Introduction, Features of Internet, Internet applications, Services of Internet, Logical and physical addresses, Internet Service Providers, Domain Name System, Security-Forms of attacks, legal approaches to network security.

Unit-4

Web Basics: Introduction to web, web browsers, web servers, Protocol, HTTP/HTTPS, TCP/IP, Email, FTP, SMTP, SNMP, URL, HTML and CSS.

Unit-5

Computer Graphics: Scope of Computer Graphics, Overview of 3D Graphics, Modelling-modelling individual objects, modelling entire scenes. Dealing with global lighting - Ray tracing, Radiosity. Rendering and Animation.

TEXTBOOKS

1. J.GlennBrookshear,"ComputerScience:AnOverview",Addision-Wesley,TwelfthEdition,2014.

2. PradeepKSimha,"ComputerFundamentals-Concepts,Systems&Applications",8th edition,BPB.

II SEMESTER	L	T	P	C
	3	-	-	3
20EE2T01: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING				

COURSE OUTCOMES: ***After successful completion of this course, students should be able to:***

CO1 : Analyze different electrical networks using KVL, KCL and Theorems.

CO2 : Understand the basic concepts of single-phase system for simple AC circuit.

CO3 : Demonstrate the construction, working and operating characteristics of AC & DC machines.

CO4 : Study the construction details, operation and characteristics of various semiconductor devices, digital and logic operations.

SYLLABUS

UNIT-I : ELECTRICAL CIRCUITS

Basic definitions – types of network elements Electrical Circuit Elements (R, L and C), Voltage and Current Sources, Ohms Laws, Kirchoff's Laws and Star/Delta Conversion, Series-Parallel- Series and Parallel (Only Resistor), Superposition, Thevenin's and Norton's Theorems, Problems in Simple Circuits with DC Excitation.

UNIT-II : AC FUNDAMENTALS

Representation of Sinusoidal Waveforms, Peak and RMS Values. Real Power, Reactive Power, Apparent Power, Power Factor. Concept of phase angle and phase difference Single phase Circuits - Voltage and Current Relations in Star/Delta Connections-Simple Problems.

UNIT-III : ELECTRICAL MACHINES

Electrical Machines: DC Machines: Classification of DC Machines-DC Generator and Motor Construction-Principle of operation –EMF Equation-Performance Characteristics-Simple problems AC Machines: Classification of AC Machines-Transformers-Synchronous Machines, Induction motor Performance Characteristics-Starting Methods-Simple problems.

UNIT- IV : Semi -Conductor Devices and Its Characteristics

Characteristics of PN Junction Diode — Zener Diode- Intrinsic and Extrinsic Semiconductors – Semiconductor Diodes– Bipolar Junction Transistors-CB, CE, CC Configurations and Characteristics – FET – MOSFET – Silicon-controlled Rectifier – DIAC – TRIAC-Half wave and Full wave Rectifiers-Voltage Regulation.

UNIT-V : INTRODUCTION TO DIGITAL ELECTRONICS

Binary Number System – Logic Gates – Boolean Algebra -De Morgan's Theorem-Simplification of Boolean Expressions using De Morgan's Theorem – Half and Full Adders – A/D and D/A Conversion.

TEXT BOOKS:

1. Basic Electrical Engineering, D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGrawHill.
2. Basic Electrical Engineering, P. V. Prasad, S. Sivanagaraju, K. R. Varmah, and Chikku Abraham, Cengage, 2019.

3. Basic Electrical & Electronics Engineering – J. B. Gupta, S. K. Kataria& Sons Publications, 2019 edition.

REFERENCE BOOKS:

1. Basic Electrical Engineering - D.C. Kulshreshtha, 2009, Tata McGraw Hill.
2. Fundamentals of Electrical Engineering, L.S. Bobrow, Oxford University Press, 2011
3. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010.
4. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.
5. Principles of Electrical Engineering and Electronics", V K Mehta & RohitMehta,S Chand Publishers,2019 edition.

II SEMESTER	L	T	P	C
	-	-	3	1.5
20CS2L03: OBJECT ORIENTED PROGRAMMING LAB WITH PYTHON				

COURSE OUTCOMES:

CO1: Apply core programming basics and program design with functions using Python programming language.
CO2: Interpret the high-performance programs designed to strengthen the practical expertise.
CO3: Develop applications for real time problems by applying python data structure concepts.
CO4: Test and apply the concepts of packages, handling, multithreading and socket programming.
CO5: Divide the importance of object-oriented programming over structured programming.

Exercise 1 - Basics

a) Running instructions in Interactive interpreter and a PythonScript
b) Write a program to purposefully raise Indentation Error and Correct it

Exercise 2 - Operations

a) Write a program to compute distance between two points taking input from the user.
b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

a) Find the sum of all the primes below two million. Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89...
b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Exercise 4 - Control Flow - Continued

a) Find the sum of all the primes below two million. Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89...
b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Exercise - 5 - DS

a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure
b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Exercise - 6 DS - Continued

a) Write a program combine lists that combines these lists into a dictionary.
b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 7 Files

a) Write a program to print each line of a file in reverse order.
b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball collides that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions - Continued

a) Write a function nearly equal to test whether two strings are nearly equal. Two strings a, b are nearly equal when a can be generated by a single mutation on b.

b) Write a function dups to find all duplicates in the list.

c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function cumulative product to compute cumulative product of a list of numbers.

b) Write a function reverse to reverse a list. Without using the reverse function.

c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Exercise 11 - Multi-D Lists

a) Write a program that defines a matrix and prints

b) Write a program to perform addition of two square matrices

c) Write a program to perform multiplication of two square matrices

Exercise - 12 - Modules

a) Install packages requests, flask and explore them. using(pip)

b) Write a script that imports requests and fetch content from the page.

c) Write a simple script that serves a simple HTTP Response and a simple HTML Page

Exercise - 13 OOP

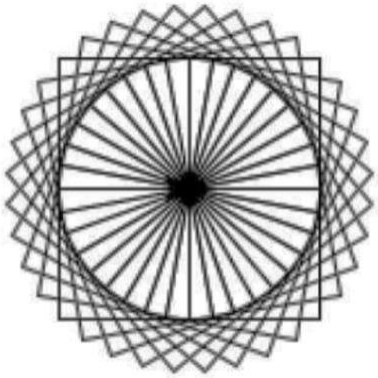
a) Class variables and instance variable and illustration of the self-variable

i) Robot ii) ATM Machine

Exercise - 14 GUI, Graphics

a) Write a GUI for an Expression Calculator using tk

b) Write a program to implement the following figures using turtle.



II SEMESTER	L	T	P	C
	-	-	3	1.5
20EE2L01: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB				

COURSE OUTCOMES: ***After successful completion of this course, students should be able to:***

CO1 : Acquire knowledge on electrical networks by using KVL, KCL.

CO2 : Analyze the performance characteristics and to determine efficiency of DC machines

CO3 : Understand the characteristics of AC machines

CO4 : Apply knowledge on PN junction diode , transistor and Rectifiers

LIST OF EXPERIMENTS

SECTION A: ELECTRICAL ENGINEERING:

1. Verification of KCL& KVL.
2. Open circuit Characteristics of DC Shunt generator.
3. Swinburne's test on DC Shunt Motor.
4. Brake test on DC Shunt motor.
5. Speed control of D.C. Shunt motor by a) Armature Voltage control b) Field flux control method
6. Open circuit and Short circuit test on a Single Phase Transformers.
7. Draw the Torque-Slip Characteristic of a Three Phase Induction Motor.
8. Regulation of Synchronous Machine using EMF Method.

SECTION B: ELECTRONICS ENGINEERING:

The following experiments are required to be conducted as compulsory experiments:

1. PN junction diode characteristics a) Forward bias b) Reverse bias (Cut in voltage and Resistance calculations)
2. Transistor CE characteristics (input and output)
3. Half wave rectifier with and without filters.
4. Full wave rectifier with and without filters.

Any 10 Experiments has to be conducted from Section A& B

REFERENCE BOOKS:

1. Department lab manual.

II SEMESTER	L	T	P	C
	-	-	3	1.5
20BS2L02: ENGINEERING CHEMISTRY LAB				

Outcomes: The experiments introduce volumetric analysis: Acid-Base, complexometric, Redox, Conductometric and potentiometric titrations. Then they are exposed to a few instrumental methods of chemical analysis.

Thus at the end of the lab course, the student is exposed and able to

1. Identify the concentration of given solution by different methods of chemical analysis (**K3**)
2. Analyze the water purity by checking hardness, DO and Acidity. (**K4**)
3. Estimate the Cu^{+2}, Fe^{+3}, Ca^{+2}, Mg^{+2} ions and Ascorbic acid present in given solution. (**K4**)
4. Identify the pour and cloud point of lubricants. **(K3)**
5. Understand the principles of conductometric and potentiometric titrations. (**K2**)

Syllabus:

1. Estimation of HCl using standard Na_2CO_3 through acid-base titration.
2. Estimate the total hardness of water using standardized EDTA solution through complexometric titration.
3. Estimation of $KMnO_4$ using standard $H_2C_2O_4$ through redox titration method.
4. Estimation of Dissolved Oxygen in given water sample by Wrinkler's Method
5. Determination of Ferric (Fe^{+3}) ions using standard $K_2Cr_2O_7$ solution
6. Determination of Copper (II) using standard hypo solution.
7. Estimation of strong acid by using strong base through conductometric titration method.
8. Estimation of strong acid by using strong base through potentiometric titration method.
9. Preparation of polymer (Demo).
10. Determination of Vitamin 'C'.
11. Determination of Pour and Cloud Point of lubricating oils

Reference Books

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.

II SEMESTER	L	T	P	C
	-	-	3	1.5
20HS2L02: ENGLISH COMMUNICATION LAB				

COURSE OBJECTIVES

- To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
- To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
- To assist students to carry on the tasks and activities through guided instructions and materials.
- To effectively integrate English language learning with employability skills and training.
- To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
- To provide hands-on experience through case-studies, mini-projects, group and individual presentations.

COURSE OUTCOMES

e) Reading Skills.

- Addressing explicit and implicit meaning of a text.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

f) Writing Skills:

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, E-Mails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

g) Interactive skills:

- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

h) Life Skills and Core Skills:

- Examining self-attributes and identifying areas that require improvement self-diagnosis, self-motivation.
- Adopting to a given situation and developing a functional approach to find solutions-adaptability, problem-solving.
- Understanding the importance of helping others-community service, enthusiasm.

RELATIONSHIP OF COURSE TO PROGRAMME OUTCOMES

A	Ability to apply knowledge of mathematics, science, and engineering.	
B	Ability to design and conduct experiments, as well as to analyze and interpret data.	
C	Ability to design anEngineering system, component, or process.	
D	Ability to function on multi-disciplinary teams	
E	Ability to identify, formulate and solve engineering problems.	
F	Understanding of professional and ethical responsibility.	
G	Ability to communicate effectively	√
H	Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.	√
I	Recognition of the need for and an ability to engage in life-long learning.	
J	Knowledge of contemporary issues.	
K	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practices.	
L	Ability to find location of substations and benefits derived through their optimal location.	

COURSE DESCRIPTION

Communicating in a language is also a skill. So a student has to look for an opportunity to practice English language in order to acquire proficiency in English. 'Enrich your interactive Skills: Part - A' is designed to provide opportunities for engineering students to revise and consolidate the basic skills in listening, speaking, reading and writing in addition to giving ample practice in various communicative functions and Life skills.

PREREQUISITES

The student is expected to have basic knowledge in English language and must be able to write in English. He is also expected to possess fundamental knowledge of general English grammar and vocabulary.

Syllabus

Unit	TOPIC
1	Vowels, Consonants, Pronunciation, Phonetic transcripts
2	Word stress and syllables
3	Rhythm and Intonation
4	Contrastive Stress –Homographs
5	Word Stress : Weak and Strong forms , Stress in compound words

Text Book:

"InfoTech English" by Maruthi Publications

Reference Books:

5. Better English Pronunciation by O' Connor
6. Phonetics and Phonology – Peter Roach
7. A Grammar of Spoken English – Harold Palmer
8. English Phonetics – Bansal and Harrison

Testing Pattern:

B) Internal lab Exam: 30 Marks

Regular performance in the language /communication /lab completion in the lab manual 15M

Written test 15M

B) External lab Exam Pattern: 70 Marks

Written test 30M

Oral test 30M

Viva(during exam marks will be awarded by external examiner) 10M

III SEMESTER	L	T	P	C
	3	-	-	3
20IT3T01 : DISCRETE MATHEMATICS				

Course Objectives:

1. Familiarize closed form solution of linear recurrence relations by various methods.
2. To introduce basics of set theory and its applications
3. Bring awareness of basic concepts of graphs and its applications.
4. To teach the topics on Trees, spanning trees, minimal spanning trees and justification of Kruskal's algorithm.

Course Outcomes:

Upon successful completion of this course the student should be able to

1. Identify programming errors efficiently through enhanced logical capabilities (K3)
2. Find a general solution of recurrence equation (K3)
3. Learn set theory, graph of the relations which are used in data structures (K3)
4. Explain the concepts in graph theory (K3)
5. Apply graph theory concepts in core subjects such as data structures and network theory effectively. (K3)

UNIT I: Mathematical logic Connectives, negation, conjunction, disjunction, statement formula and Truth Tables, conditional and bi-conditional, well-formed formulae, tautologies, equivalence of formulae, duality, tautological implications, functionally complete set of connectives, other connectives, principal disjunctive and conjunctive normal forms, inference calculus, rules of inference, consistency of premises, indirect method of proof, Theory of inference for the statement calculus, validity using Truth tables.

Learning Outcomes:

After completion of this unit, student will be able to

- find equivalence formulas, implementation of logic for mathematical proofs (K1)
- apply inference theory to verify the consistency of data (K3)

UNIT II: Recurrence relations Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, solving recurrence relation by substitution and Generating functions, the method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

Learning Outcomes:

After completion of this unit student will be able to

- formulate recurrence relations of the sequences (K3)
- solve homogeneous linear recurrence relations (K3)
- evaluate complementary function and particular integral for non-homogeneous linear recurrence relations (K3)
- apply substitution method to solve non-linear recurrence relations (K3)

UNIT III: Set theory and Relations. Relations and ordering, Relations, Properties of binary Relations on a set, Relation Matrix and the Graph of a Relation, partition and covering of a set, Equivalence, Compatibility Relations, Composition of Binary Relations, Partial ordering, Hasse diagram, Principle of Inclusion-Exclusion, Pigeonhole Principle and its applications.

Learning Outcomes:

After completion of this module, student will be able to

- draw Hasse Diagram for the given poset(K3)
- apply principle of inclusion and exclusion and pigeonhole principle to real world problems(K3)

UNIT IV: Graph theory Basic Concepts, Representation of Graph, Sub graphs, Multigraphs,Euler Paths, Euler circuits, Hamiltonian Graphs and Graph Isomorphism and its related Problems, Chromatic Number. (All Theorems without proofs)
After completion of this unit student will be able to
● identify different graphs and their properties (K3)
● construct Euler and Hamiltonian graphs(K3)
● construct the graph for the given data (K3)

UNIT V: Trees Spanning Trees, minimal Spanning Trees, BFS, DFS, Kruskal's Algorithm, Prim's Algorithm, Binary trees, Planar Graphs. (All Theorems without proofs)
Learning Outcomes:
After completion of this unit, student will be able to
● construct the spanning tree and binary trees from graphs (K3)
● build minimal spanning tree by using different algorithms (K3)

Textbooks:
1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 1997.
2. Joe L. Mott, Abraham Kandel and T. P. Baker, Discrete Mathematics for computer scientists & Mathematicians, 2/e, Prentice Hall of India Ltd, 2012.

References:
1. Keneth. H. Rosen, Discrete Mathematics and its Applications, 6/e, Tata McGraw-Hill, 2009.
2. Richard Johnsonburg, Discrete Mathematics, 7/e, Pearson Education, 2008
3. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, Prentice Hall of India, 2006.

III SEMESTER	L	T	P	C
	3	-	-	3
20BM3T01 : MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS				

Course Objectives:

1. To acquire knowledge of economics to facilitate the process of economic decision making
2. To analyze production function and its laws of variable proportions and cost concepts
3. To differentiate and distinguish price and output decisions in different market structures
4. To compare and contrast the differences between private and public sector in their functioning
5. To develop the skills and to analyze financial statements

Course Outcomes:

1. Describe the importance of Managerial Economics and its utility in decision making(K2)
2. Generalize the meaning and usefulness of the production function and cost function in analyzing the firms production activity(K2&K3)
3. Comprehend the market structure, different types of markets and pricing policies(K4&K1)
4. Identify the different forms of business organization and analyze their merits and demerits(K1)
5. Evaluate the Investment proposal through techniques of capital budgeting and financial performance of the company through financial statements(K5)

UNIT–I Managerial Economics and Demand Analysis:

Definition – Nature and Scope of Managerial Economics - Relation with other disciplines - Concept of Demand-Types-Determinants - Law of Demand - Elasticity of Demand - Types and Measurement-Demand forecasting.

UNIT–II Production and Cost Analysis:

Production function - Law of Variable proportions - Isoquants and Iso costs -Law of returns- Economies of Scale - Cost Concepts - Cost Volume Profit Analysis – Applications of BEP (Simple Problems).

UNIT-III Market Structures and Pricing Policies:

Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly – Features – Price & Output Determination - Pricing Methods

UNIT-IV Forms of Organizations and Business Cycles:

Business Organization- Sole Trader – Partnership - Joint Stock Company - State/Public Enterprises and their forms - Business Cycles: Meaning and Features - Phases of Business Cycle.

UNIT–V Capital Budgeting and Accounting:

Concept and sources-Techniques of evaluating capital budgeting (Simple problems)

Introduction to Accounting: Branches-Systems of Accounting-Single Entry-Double Entry System-Journal-Ledger-Trail Balance-Final Accounts-Ratio Analysis(Simple problems)

TEXTBOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.

2. T.V.Ramana& B. Kuberudu: Managerial Economics and Financial Analysis, Himalaya Publishing House,Mumbai

3. Varshney &Maheswari: Managerial Economics, Sultan Chand, 2003.

REFERENCE BOOKS:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.

2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.

3. Suma Damodaran, Managerial Economics, Oxford University Press.

4. Lipsey &Chrystel, Economics, Oxford University Press.

5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.

6. Domnick Salvatore: Managerial Economics in a Global Economy, 4th Edition, Thomson. 7. Narayanaswamy: Financial Accounting A Managerial Perspective, PHI.

8. Raghunatha Reddy &Narasimhachary: Managerial Economics& Financial Analysis, Scitech.

9. S.N.Maheswari& S.K. Maheswari, Financial Accounting, Vikas.

III SEMESTER	L	T	P	C
	3	-	-	3
20IT3T02 : COMPUTER ORGANIZATION				

COURSE OBJECTIVES

1. To discuss the basic knowledge of computer system including the analysis and design of components of the system.
2. To understand the register transfer language, micro operations and design of basic components of the system.
3. To explain different types of addressing modes and memory organization.
4. To learn the concepts of parallel processing, pipelining and vector processing.

COURSE OUTCOMES

After completion of the course students able to

1. Explain knowledge on structure of computers and computer arithmetic.
2. Analyze Micro operations such as Arithmetic micro operations, Shift micro operations and Logic micro operations.
3. Define the appropriate addressing modes and instructions for writing programs.
4. Demonstrate the Peripheral devices for efficient operation of system.
5. Describe the basic knowledge on parallel and vector processing.

UNIT-I

Basic Structure of Computers:

Basics of computer, Von Neumann Architecture, Generation of Computer, Types of Computer, Functional unit, Basic Operational Concepts and Bus Structures.

Computer Arithmetic: Addition and Subtraction, multiplication algorithms, Division Algorithms.

UNIT-II

Register Transfer Language and Micro Operations: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions, Timing and control, Instruction Cycle, Memory – Reference, Input – Output and Interrupt Instructions. Design of basic computer, Design of Accumulator logic.

UNIT-III

Central Processing Unit: General Register Organization, STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation, Program control, Reduced Instruction Set Computer.

Micro Programmed Control: Control Memory, Address sequencing, micro program example, design of control unit.

UNIT-IV

Input- Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct memory Access.

The Memory System: Memory Hierarchy, Main Memory, Auxiliary memory, Associative Memory, Cache Memory and Virtual Memory.

UNIT-V

Parallel Processing and Vector Processing

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

Text Books:

1. Computer System Organization, M. Moris Mano, 3rd Edition, Pearson / PHI, 2017.
2. Computer Organization, Carl Hamacher, ZvonksVranesic, SafwatZaky, 5th Edition, McGraw Hill, 2016.
3. Computer Organization, A quantitative approach, John L. Hennessy and David A.Patterson, Fifth Edition, 2017.

Reference Books:

1. Computer Organization and Architecture - William Stallings, Ninth Edition, Pearson / PHI, 2012.
2. Structured Computer Organization - Andrew S Tanenbaum, 6th Edition, PHI/ Pearson, 2016.

III SEMESTER	L	T	P	C
	3	-	-	3
20CS3T01 : DATA STRUCTURES				

COURSE OBJECTIVES

1. To impart the basic concepts of data structures and algorithms.
2. To gain knowledge of linear and non-linear data structures.
3. To familiarize with different sorting and searching techniques.
4. To understand basic concepts about stacks, queues, lists, trees and graphs.
5. To understand about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

COURSE OUTCOMES:

After the completion of this course, students will be able to

1. Design applications using stacks and implement various types of queues.
2. Analyze and implement operations on linked lists and demonstrate their applications.
3. Demonstrate operations on trees.
4. Demonstrate implementation of various types of Graphs and Graph Traversals.
5. Implement various searching and sorting techniques.

UNIT-I:

Introduction: Definition of data structure, types and overview of data structures.

Algorithm: Preliminaries of algorithm, Algorithm analysis and complexity.

Stacks and Queues: Stack Representation using Arrays, operations on stack, Applications of stacks - Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions. Queue Representation using Arrays, operations on queues, Applications of queues, Circular queues, Priority queues, Implementation of queue using stack.

UNIT-II:

Linked Lists: Introduction, Single linked list, representation of a linked list in memory**,** Operations on a single linked list. Double linked list, Operations on a double linked list. Circular linked list, Operations on a circular linked list. Applications of single linked list.

UNIT-III:

Trees: Basic tree concepts. **Binary Trees:** Properties, Representation of Binary Trees using Arrays and Linked List, Binary Tree Traversals, Creation of binary tree from pre-order, in-order and post order traversals, threaded binary tree. **Binary search trees:** Basic concepts, BST operations: Search, insertion, deletion and traversals, Creation of binary search tree from in-order and pre (post)order traversals.

AVL Trees: Self Balanced Trees, Height of an AVL Trees and AVL Tree Rotations.

UNIT-IV:

Graphs: Basic concepts, Representations of Graphs: using Linked list and adjacency matrix, Graph Traversals - BFS & DFS, Applications: Dijkstra's shortest path algorithm, Minimum Spanning Tree using Prim's algorithm and Kruskal's algorithm, Transitive closure, Warshall's algorithm.

UNIT-V:

Searching: Linear Search, Binary Search and Fibonacci search.

Sorting: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort and Radix sort.

Hashing: Introduction, Hash Function, Collision Resolution Techniques: Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Separate Chaining, Extendible Hashing.

TEXT BOOKS:

1. Richard F. Gilberg and Behrouz.A. ForouzanData Structures: A Pseudo code approach with C, 2nd edition, Cengage, 2012.
2. Debasissamanta, Classic Data Structures, PHI, 2nd edition, 2016.
3. YashavantKanetker, Data Structures through C, 2nd edition BPB publications, 2017.
4. Alfred V Aho, John E Hopcraft, Jeffery D Ullman, Data Structures & Algorithms, Pearson Education Ltd., Second Edition, 2016.

REFERENCE BOOKS

1. Seymour Lipschutz, Data Structure with C, TMH, 2017.
2. G. A. V. Pai, Data Structures and Algorithms, TMH, 2017.
3. Horowitz, Sahani, Anderson Freed,Fundamentals of Data Structure in C, University Press, 2nd edition, 2018.

III SEMESTER	L	T	P	C
	3	-	-	3
20IT3T03 : JAVA PROGRAMMING				

COURSE OBJECTIVES:

1. Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc
2. Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms
3. Understand the principles of inheritance, packages and interfaces.
4. Be aware of the important topics and principles of software development.
5. Have the ability to write a computer program to solve specified problems.
6. Be able to use the Java JDK environment to create, debug and run simple Java programs.

COURSE OUTCOMES:

After the completion of this course, students will be able to

1. Know the concepts of OOP and orientation towards Java programming.
2. Apply the inheritance and packages in Java.
3. Implement the concepts of Exception handling and Multithreading.
4. Getting knowledge of I/O concepts and should be able to read and write data from and to File and HttpClient.
5. Know the concepts and usage of Collection framework.

UNIT-I:

Introduction to Java: History, java features, JDK, JRE, and JVM, program structure, Creating and Executing a Java program, Java tokens, Variables, Arrays, Data types, Operators, Expressions, **Control statements**: Selection , Iterative and Jump Statements, type conversion and casting.

Classes and objects: Class declaration, creating objects, methods, **Constructors**: Types of constructors: Default and Parameterized constructors, overloading methods and constructors, garbage collection, access control, static and this keywords, command line arguments, nested classes.

UNIT-II:

Inheritance: Extending a class, types of inheritance, super keyword, final keyword, overriding methods, abstract methods and classes.

Interfaces: Defining an interface, implementing interface, Differences between classes and interfaces, variables in interface and extending interfaces.

Packages: Java API packages, creating and importing packages, importance of CLASSPATH.

UNIT-III:

Exception handling: Exception handling fundamentals, exception hierarchy, usage of try, catch, throw, throws and finally keywords, built-in and user defined exceptions.

Multithreading: Introduction, Differences between multi threading and multitasking, Creating Threads, thread life cycle, thread methods, thread priorities, thread exceptions, thread synchronization, Inter thread communication, Daemon threads.

UNIT-IV:

Input/Output Streams: Introduction to java I/O, Streams, BufferedStreams, Readers, Reading and Writing data from/to files and HttpClient, Pipelines.

UNIT-V:

Collection Framework: Lists – ArrayList&LinkedList, Sets - HashSet&TreeSet, Maps - HashMap&TreeMap, Queue, Stack, Iterator – ListIterator, Lambda Expressions.

Strings: Strings in java, Creation of a String and String handling methods, StringBuilder, StringBuffer.

TEXT BOOKS:

1. Herbert Schildt: "Java The complete reference", 11th Edition, Tata McGraw Hill, 2019.
2. E.Balaguruswamy: "Programming with Java A Primer", 5th Edition, Tata McGraw Hill, 2017.

REFERENCE BOOKS:

1. Programming in Java by SaurabhChaudhary and SachinMalhotra, revised 2nd edition, Oxford, 2018.
2. Java: How to Program, 8/e, Dietal, Dietal, PHI, 2018.
3. Core JAVA: An integrated approach, Dr. R. NageswaraRao, Wiley, Dream Tech, 2016.

III SEMESTER	L	T	P	C
	-	-	3	1.5
20CS3L01 : DATA STRUCTURES LAB				

COURSE OUTCOMES:

At the end of the lab students are able to

1. Implement stack and queue using arrays and linked lists.
2. Demonstrate applications of stack.
3. Demonstrate the implementation of linked lists.
4. Demonstrate the implementation of binary search trees.
5. Implement different searching and sorting algorithms.

LIST OF EXPERIMENTS:

1. Implement a menu driven program for the following operations on stack of integers using arrays.
   - i) PUSH()
   - ii) POP()
   - iii) PEEK()
   - iv) Display of stack elements
2. Implement a program to demonstrate how stack can be used to check whether the given string is palindrome or not.
3. Implement a Program for converting an infix expression to postfix expression.
4. Implement a Program to evaluate postfix expression.
5. Implement a menu driven program for the following operations on queue of integers using arrays.
   - i) Insertion
   - ii) Deletion
   - iii) Queue overflow and underflow conditions
   - iv) Display of queue elements
6. Implement a program for the queue operations by using stacks.
7. Implement a program for the following

   (i) Create a singly linked list.

   (ii) Insert an element into a singly linked list.

   (iii)Delete an element from a singly linked list.
8. Implement a program for stack operations using Linked list.
9. Implement a program for queue operations using linked list.
10. Implement a program to reverse elements of a single linked list.

11. Implement a program for the following

(i) Create a circular linked list.

(ii) Insert an element into a circular linked list.

(iii) Delete an element from a circular linked list.

12. Implement a program for the following

(i) Create a Doubly linked list.

(ii) Insert an element into a doubly linked list.

(iii) Delete an element from a doubly linked list.

13. Implement a program to create a Binary Search Tree of integers, insert, delete and search integers into (from) Binary search tree.

14. Implement a program by using recursive functions to traverse a binary search tree in preorder, in-order and post-order.

15. Implement programs for recursive and iterative functions to perform Linear search for a Key value in the given list.

16. Implement programs for recursive and iterative functions to perform Binary search for a Key value in the given list.

17. Implement following techniques to sort a given list of integers in ascending order.

(i) Insertion sort

(ii) Bubble sort

(iii) Selection sort

18. Implement a program that read any string and sort in alphabetical order using Bubble sort.

19. Implement following techniques to sort a given list of integers in ascending order.

(i) Quick sort

(ii) Merge sort

III SEMESTER	L	T	P	C
	-	-	3	1.5
20IT3L01 : COMPUTER ORGANIZATION LAB				

COURSE OUTCOMES:

At the end of the lab, the students are able to

1. Simulate the 8085/8086 microprocessor.
2. Implement the assembly language programs to perform different operations.

LIST OF EXPERIMENTS:

Note: Implement the following list of Assembly Language programs by using 8085/8086.

1a) Write a Program to perform Addition of two numbers.

1b) Write a Program to perform Subtraction of two numbers.

2a) Write a Program to perform Addition of n numbers.

2b) Write a Program to generate n numbers.

3a) Write a Program to generate n Even numbers.

3b) Write a Program to generate n Odd numbers.

4a) Write a Program to move data from one block to another block.

4b) Write a Program to mask 4 high-order bits.

5a) Write a Program to read data at location 4400 and unpack data into 07, 0E and store in 4401 & 4402.

5b) Write a Program to subtract an array of elements to get positive result.

6a) Write a Program to find largest element of an array.

6b) Write a Program to perform Linear Search operation.

7a) Write a Program to find smallest element of an array.

7b) Write a Program to find largest value among two numbers.

8a) Write a Program to find smallest value among two numbers.

8b) Write a Program to find factorial of given number.

9a) Write a Program to generate Fibonacci Series.

9b) Write a Program to convert a number from Hexadecimal to BCD.

10a) Write a Program to separate Even and Odd numbers.

10b) Write a Program to find 1’s Complement and 2’s Complement of a number.

11a) Write a Program to perform addition of first n numbers.

11b) Write a Program to perform Division of two 8-bit numbers.

12a) Write a Program to Convert ASCII to Decimal and vice versa.

12b) Write a Program to convert a number from Hexadecimal to Decimal.

III SEMESTER	L	T	P	C
	-	-	3	1.5
20IT3L02 : JAVA PROGRAMMING LAB				

COURSE OBJECTIVES

1. Understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
2. Able to implement Exception Handling, Multithreading, Applet programming and Event handling in java.

COURSE OUTCOMES

After the completion of this course, students will be able to

1. Develop solutions for a range of problems using object-oriented programming.
2. Create Java programs that solve simple business problems.

LAB EXPERIMENTS

1. Installation of JDK, setting Class path and Executing simple java programs.
2. Write a program that displays welcome dear user followed by user name. Accept username from the user.
3. Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
4. Write a JAVA program that checks whether a given string is a palindrome or not by using command line arguments.
5. Write a JAVA program to implement array of objects.
6. Write a JAVA program to practice using String class and its methods.
7. Write a JAVA program to implement constructor overloading.
8. Write a JAVA program implement method overloading.
9. Write a JAVA program to implement multilevel inheritance by applying various access controls to its data members and methods.
10. Write a JAVA program to create and Manage bank account using inheritance concept.
11. Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?
12. Write a JAVA program to demonstrate super key word.
13. Write a JAVA program to develop a vehicle class hierarchy in Java to demonstrate the concept of polymorphism.
14. Write a JAVA program to demonstrate user defined packages.
15. Write a JAVA program for abstract class to find areas of different shapes.
16. Write a JAVA program for creation of Java Built-in Exceptions

17. Write a JAVA program for creation of User Defined Exception
18. Write a JAVA program that creates 3 threads by extending Thread class. First thread displays "Good Morning" every 1 sec, the second thread displays "Hello" every 2 seconds and the third displays "Welcome" every 3 seconds. (By implementing Runnable interface).
19. Write a program to read contents from a file using BufferedInputStream.
20. Write a program to read contents from a web page using HttpClient and Buffered Reader and write them to a local file using BufferedWriter.
21. Write a program to read two numbers and one operator from user console and perform the calculation.
22. Write a JAVA program to get sub list from ArrayList.
23. Write a JAVA program to iterate all elements of a list in both directions.
24. Write a JAVA program to add all elements of a list to LinkedList.
25. Write a JAVA program to implement the basic operations on TreeMap.

Text Books:

1. Herbert Schildt: "Java The complete reference", 8th Edition, Tata McGraw Hill, 2017.
2. E. Balaguruswamy: "Programming with Java A Primer", 5th Edition, Tata McGraw Hill, 2017.

III SEMESTER	L	T	P	C
	1	-	2	2
20IT3S01 : DATA ANALYSIS AND VISUALIZATION				

COURSE OUTCOMES:

After the completion of this course, students will be able to know

1. How to present data using some of the data visualization libraries in Python, including Matplotlib, Seaborn and Folium
2. How to use basic visualization tools, including area plots, histograms, and bar charts
3. How to use specialized visualization tools, including pie charts, box plots, scatter plots and bubble plots
4. How to use advanced visualization tools, including waffle charts, word clouds and Seaborn and regression plots
5. How to create maps and visualize geospatial data

Unit – I:

Introduction to spreadsheets: Reading data, manipulating data. Basic spreadsheet operations and functions.

Introduction to Business analytics: Introduction, Types of Analytics, Area of Analytics.

Unit – II:

Spreadsheet Functions to Organize Data: Conditional formatting, Logical functions: Lookup and reference functions, IF, Nested IF, VLOOKUP, HLOOKUP, MATCH, INDEX and OFFSET functions in Excel.

Statistical functions: Introduction, SUMIFS, COUNTIF, PERCENTILE, QUARTILE, STDEV, MEDIAN and RANK Function

Unit – III:

Introduction to Visualization Tools: Introduction to Data Visualization, Introduction to Matplotlib, Basic Plotting with Matplotlib, Dataset on Immigration to Canada, Line Plots

Unit – IV:

Basic and Specialized Visualization Tools

Area Plots, Histograms, Bar Charts, Pie Charts, Box Plots, Scatter Plots, Bubble Plots

Advanced Visualization Tools

Waffle Charts, Word Clouds, Seaborn and Regression Plots

Unit – V: Creating Maps and Visualizing Geospatial Data

Introduction to Folium, Maps with Markers, Choropleth Maps

TEXT BOOKS:

1. **Data Analysis And Visualization Using Python: Analyze Data To Create Visualizations For Bi Systems by Dr. Ossama Embarak, Apress, 2019.**

2. Data Analytics and Visualization: Understand, evaluate, and visualize data by Phuong Vo.T.H, Martin Czygan, Ashish Kumar, Kirthi Raman, Packt Publishing Limited, 2017.

III SEMESTER	L	T	P	C
	2	-	-	-
20CE3M01 – ENVIRONMENTAL SCIENCE				

UNIT-I: Multidisciplinary nature of Environmental Studies:
Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects;. Role of information technology in environment and human health.
Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-II: Natural Resources:
Natural resources and associated problems. Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.
Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.
Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.
Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.
Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT-III: Biodiversity and its conservation:
Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT – IV Environmental Pollution:
Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his wellbeing.
Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT – V Social Issues and the Environment:
Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.
Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

Text Books:

1. K. V. S. G. Murali Krishna , Environmental Studies,VGS Publishers, Vijayawada, 2010
2. R. Rajagopalan, Environmental Studies, 2nd Edition, Oxford University Press, 2011
3. P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani, Environmental Studies, 2nd Edition , Pearson Education, Chennai,2015

Reference:

1. Deeshita Dave & P. Udaya Bhaskar Text Book of Environmental Studies, Cengage Learning, 2011
2. Shaashi Chawla, A Textbook of Environmental Studies, TMH, New Delhi,2017
3. Benny Joseph, Environmental Studies, Tata McGraw Hill Co, New Delhi, 2006
4. Anubha Kaushik, C P Kaushik , Perspectives in Environment Studies, New Age International Publishers, 2014

IV SEMESTER	L	T	P	C
	3	-	-	3
20MA4T07 : PROBABILITY & STATISTICS				

Course Objectives:

1. To familiarize the students with the foundations of probability and statistical methods
2. To impart probability concepts and statistical methods in various applications of Engineering
3. To introduce the correlation and regression and method of least squares

Course Outcomes:

At the end of this unit, the student will be able to

1. Make use of the concepts of probability and their applications (k3)
2. Apply discrete and continuous probability distributions (K3)
3. Use the components of a classical hypotheses test (K3)
4. Examine Significance tests based on small and large sampling tests (K3)
5. Use correlation methods and principle of least squares, regression lines (K3)

UNIT-1 PROBABILITY: Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

Learning Outcomes:

At the end of this unit, the student will be able to

- define the terms trial, events, sample space ,probability and laws of probability (K1)
- make use of probabilities of events in finite sample space from experiments (K3)
- apply Baye's theorem to real time problems(K3)
- explain the notion of random variable, distribution functions and expected value(K2)

UNIT-2 PROBABILITY DISTRIBUTIONS: Probability distributions: Binomial, Poisson and normal distribution –their properties.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies (K3)
- interpret the properties of normal distribution and its applications (K2)

UNIT-3 SAMPLING DISTRIBUTION AND TESTING OF HYPOTHESIS, LARGE SAMPLE TESTS: Basic terminology in sampling, sample techniques (with and without replacement), sampling distribution of means for large and small samples (with known and unknown variance).Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors.

Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

Learning Outcomes:

At the end of this unit, the student will be able to

- explain the concept of sampling distribution for large and small samples (K2)
- apply the concept of hypothesis testing for large samples (K4)

UNIT-4 SMALL SAMPLE TESTS: Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F- test), Chi-square test for goodness of fit and independence of attributes.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply the concept of testing of hypothesis for small samples to draw the inferences (K3)
- estimate the goodness of fit (K3)

UNIT-5 CURVE FITTING AND CORRELATION:

Curve Fitting: Method of least squares -Fitting a straight line, Second degree parabola –exponential curve-power curves

Correlation: Simple correlation, correlation coefficient (for ungrouped data), rank correlation.

Linear regression, regression lines, regression coefficients.

Learning Outcomes:

At the end of this unit, the student will be able to

- adopt correlation methods and principle of least squares and regression lines (K3)

Books:

1. Dr. K. Murugesan& P.Gurusamy, Probability and Statistics Anuradha Publications,2011

2. Dr.B.S.Grewal,Higher Engineering Mathematics, 43rd Edition, Khanna Publications 2012

Reference:

1.Ramana B.V., Higher Engineering Mathematics, Tata Mc Graw Hill New Delhi 11th Reprint2010

2.Miller& Freund, Probability and statistics for engineers by Richard A. Johnson, PHI publications,2011

IV SEMESTER	L	T	P	C
	3	-	-	3
20CS4T01 : OPERATING SYSTEMS				

COURSE OUTCOMES

After the completion of the course the students are able to

1. Define the Basic concepts about Operating System and its functions.
2. Describe Process management, CPU scheduling and Deadlocks.
3. Analyze Memory management
4. Describe and Implement File systems & Disk Structures.
5. Perform Case Study on LINUX, WINDOWS and Android OS.

UNIT – I:

OPERATING SYSTEMS OVERVIEW:

Introduction: OS Concepts – Evolution of OS, OS Structures- Kernel, Shell. Operating-System Services, System Calls, Types of System Calls, System Structure. UNIX- Introduction-Architecture, Logging In, Files and Directories, Input and Output, Programs and Processes, Error Handling, User Identification, Time Values, System Calls and Library Functions, Command-Line Arguments, UNIX File API'S.

UNIT – II:

PROCESS MANAGEMENT:

Process: Concept, Operations on Processes, Inter Process Communication, Threads-Multithreading Models, Threading Issues, Pthreads.

Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Critical Regions, Monitors, Classic Problems of Synchronization,

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms- CPU (Uniprocessor) scheduling algorithms, Multiprocessor and Real-time scheduling algorithms.

Deadlocks: Characterization – Prevention – Avoidance - Detection and Recovery

UNIT – III:

MEMORY MANAGEMENT: Basic Memory Management, Swapping, Contiguous Memory Allocation, Virtual Memory Concept, Demand Paging - Page Interrupt Fault, Page Replacement Algorithms, Segmentation – Simple, Multi-level, Segmentation with Paging, Memory Management.

UNIT – IV:

INFORMATION MANAGEMENT:

File system Interface: The concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation: File system structure, allocation methods, free-space management

Mass-storage structure: Overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, Disk Management, Swap-Space Management, RAID Structure.

UNIT – V:

CASE STUDY:

The Linux System, Microsoft Windows 7, Android Software Platform**:** Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure.

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 10th Edition, John Wiley and Sons Inc., 2018.
2. William Stallings, "Operating Systems– Internals and Design", 7th Edition, Prentice Hall, 2016.
3. Alex A Aravind, Operating Systems-S Halder, Second Edition, Pearson Education, 2016.
4. Andrew Tanenbaum, Herbert Bos, "Operating Systems", 4th Edition, 2015.

REFERENCE BOOKS:

1. Ann McIver McHoes Ida M. Flynn, "Understanding Operating Systems" Sixth Edition, Course Technology-Cengage Learning, 2011.

2. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.

3. Andrew S. Tanenbaum, Albert S. Woodhull - Amherst, "Operating Systems Design and Implementation", Third Edition, Prentice Hall, 2006.

4. W. Richard Stevens, "Advanced Programming in UNIX Environment", 2nd Ed, Pearson Education, 2005.

5. Terrence Chan, "UNIX System Programming Using C++", Prentice Hall India, 1999.

IV SEMESTER	L	T	P	C
	3	-	-	3
20IT4T03 : DATA BASE MANAGEMENT SYSTEMS				

COURSE OBJECTIVES:

The objectives of the course is

1. To describe a sound introduction to the discipline of database management systems.
2. To give a good formal foundation on Entity- Relationship (E-R) model, the relational model of data and usage of Relational Algebra.
3. To introduce the concepts of basic SQL as a universal Database language.
4. To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization.
5. To provide an overview of transaction management, Database storage and indexing techniques.

COURSE OUTCOMES

Upon successful completion of this course, students should be able to:

CO1: Explain the basic concepts of database management system and design an Entity-Relationship (E-R) model and convert E-R model to relational model.

CO2: Construct database using Relational algebra and SQL.

CO3: Apply Normalization techniques to normalize the database.

CO4: Discuss transaction management using different concurrency control protocols and recovery algorithms.

CO5: Illustrate different file organization and indexing methods.

UNIT-1

Introduction-Database System Applications, Purpose of Database Systems, View of Data - Data Abstraction, Instances and Schemas, Data Models, Database Languages , Database Architecture, Database Users and Administrators.

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model.

Relational Model: Introduction to the Relational Model - Integrity Constraints over Relations. Enforcing Integrity constraints, querying relational data, Logical data base Design, Views.

UNIT-II

Relational Algebra: Relational Algebra - Selection and Projection, Set operations, Renaming, Joins, Division.

SQL: Form of Basic SQL Query - Examples of Basic SQL Queries, UNION, INTERSECT, and EXCEPT, Introduction to Nested Queries, Correlated Nested Queries, Set Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values - Logical connectives - AND, OR and NOT - Outer Joins, Disallowing NULL values, Triggers.

UNIT-III

SCHEMA REFINEMENT AND NORMAL FORMS: Introduction to Schema Refinement - Problems Caused by redundancy, Decompositions - Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms - FIRST, SECOND, THIRD Normal forms - BCNF - Properties of Decompositions - Loss less join Decomposition, Dependency preserving Decomposition, Multi valued Dependencies - FOURTH Normal Form, Join Dependencies, FIFTH Normal form.

UNIT-IV

Transaction Management - The ACID Properties - Transactions and Schedules- Concurrent Execution of Transactions- Lock-Based Concurrency Control- 2PL, Serializability, and Recoverability- Dealing With Deadlocks - Concurrency Control without Locking.

CRASH RECOVERY: Introduction to ARIES- The Log - The Write-Ahead Log Protocol – Checkpoints - Recovering from a System Crash(ARIES) - Media Recovery.

UNIT-V

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing-Clustered Indexes, Primary and Secondary Indexes, Index data Structures - Hash Based Indexing, Tree based Indexing, Comparison of File Organizations.

Tree Structured Indexing: Intuitions for tree indexes, Indexed Sequential Access Methods(ISAM), B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.

EXT BOOKS:

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, McGrawHill Education, 3rd Edition, 2014.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw Hill, 6^{th} edition, 2016.

Reference Books:

1. Fundamentals of Database Systems, RamezElmasri, Shamkant B Navathe-7^{th} Edition, 2016.
2. Introduction to Database Systems, 8/e, C.J. Date, Pearson, 2012.
3. Database System Design, Implementation and Management, 5/e, Rob, Coronel, Thomson, 2012.

IV SEMESTER	L	T	P	C
	3	-	-	3
20CC4T01 : AUTOMATA THEORY AND COMPILER DESIGN				

Course Objectives:

1. To learn fundamentals of Regular and Context Free Grammars and Languages
2. To understand the relation between Regular Language and Finite Automata and machines
3. To learn how to design Automata's and machines as Acceptors, Verifiers and Translators
4. Understand the basic concept of compiler design, and its different phases which will be helpful to Construct new tools like LEX, YACC, etc.

Course Outcomes:

By the end of the course students can

1. Illustrate deterministic and non-deterministic finite state machines
2. Employ finite state machines to solve problems in computing using regular expressions
3. Demonstrate context free grammars and lexical analyzer of compiler design
4. Organize Syntax Analysis by Top down and Bottom up Parsing of compiler design
5. Analyze synthesized, inherited attributes and syntax directed translation schemes and determine Algorithms to generate code for a target machine

UNIT-I

Finite Automata: Need of Automata theory, Central Concepts of Automata Theory, Finite Automation, Transition Systems, Acceptance of a String, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with Є-Transitions, Minimization of Finite Automata, Finite Automata with output-Mealy and Moore Machines, Applications and Limitation of Finite Automata.

UNIT-II

Regular Expressions, Regular Sets, Identity Rules, Manipulations of REs, Equivalence between Finite Automata and Regular Expression, Inter conversion, Closure Properties of Regular Sets, Chomsky Hierarchy Classification of Grammars, Right and Left Linear Regular Grammars, Equivalence between Regular Grammar and Finite Automata, Inter Conversion.

UNIT III

Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars- Elimination of Useless Symbols, Є-Productions and Unit Productions, Normal Forms-Chomsky Normal Form and Greibach Normal Form, Applications of Context Free Grammars.

Lexical Analysis: Language Processors, Structure of a Compiler, Lexical Analysis, The Role of the Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens,

UNIT IV

Syntax Analysis: The Role of the Parser, Left Recursion, Left Factoring.

Top down Parsing: Pre Processing Steps of Top Down Parsing, Backtracking, Recursive Descent Parsing, Non-recursive Predictive Parsing, Error Recovery in Predictive Parsing.

Bottom Up Parsing: Introduction, Difference between LR and LL Parsers, Types of LR Parsers, Shift Reduce Parsing, SLR Parsers, Construction of SLR Parsing Tables, Construction of CLR (1) and LALR Parsing Tables.

UNIT V

Intermediate Code Generation: Variants of Syntax Trees, Three Address Code, Types and Declarations, Translation of Expressions, Intermediate Code for Procedures.

Code Optimization: The Principle Sources of Optimization, Basic Blocks, Optimization of Basic Blocks, Structure Preserving Transformations, Flow Graphs, Loop Optimization, Data-Flow Analysis, Peephole Optimization.

Code Generation: Issues in the Design of a Code Generator, Object Code Forms, Code Generation Algorithm, Register Allocation and Assignment.

Text Books:

1) Introduction to Automata Theory, Languages and Computation, J. E. Hopcroft, R. Motwani and J. D. Ullman, 3rd Edition, Pearson, 2008

2) Theory of Computer Science-Automata, Languages and Computation, K. L. P. Mishra and N. Chandrasekharan, 3rd Edition, PHI, 2007

3) Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, Pearson Publishers, 2007.

Reference Books:

1) Introduction to Automata and Compiler Design, Dasaradh Ramaiah K, PHI

2) Elements of Theory of Computation, Lewis H.P. & Papadimition C.H., Pearson /PHI

3) Theory of Computation, V. Kulkarni, Oxford University Press, 2013

4) Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014

5) Compiler Construction, Principles and Practice, Kenneth C Louden, Cengage Learning, 2006

6). Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.

7). Optimizing Compilers for Modern Architectures, Randy Allen, Ken Kennedy, Morgan Kauffmann, 2001.

8) Levine, J.R., T. Mason and D. Brown, Lex and Yacc, edition, O'Reilly & Associates, 1990

e-Resources:

1) https://nptel.ac.in/courses/106/104/106104028/

IV SEMESTER	L	T	P	C
	3	-	-	3
20CC4T02 : FUNDAMENTALS OF CYBER SECURITY				

COURSE OBJECTIVE

This course will enable the students:

1. To familiarize various types of cyber-attacks and cyber-crimes.
2. To give an overview of the cyber laws.
3. To study defensive techniques against these attacks.
4. To study cyber security challenges and implications.
5. To know about cyber security.

COURSE OUTCOMES

After completion of this course, the students shall be able to:

1. Understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers and digital information.
2. Identify & Evaluate Information Security threats and vulnerabilities in Information Systems and apply security measures to real time scenarios
3. Identify common trade-offs and compromises that are made in the design and development process of Information Systems
4. Demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection
5. Illustrate the cybercrime & cyber terrorism and to know about the privacy issues

UNIT-I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIATriad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT-II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

UNIT-III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT-IV

Cyber Security: Organizational Implications: Introduction cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

UNIT-V

Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

TEXT BOOK:

1.Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley

2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCES:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.

2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

IV SEMESTER	L	T	P	C
	3	-	-	3
20IT4L03 : OPERATING SYSTEMS LAB IN LINUX				

COURSE OUTCOMES

At the end of the lab student is able to

1. Acquire basic knowledge in Linux operating System
2. Understand concepts of CPU Scheduling.
3. Describe process management, scheduling and concurrency control mechanisms.
4. Analyze Page Replacements and deadlocks.
5. Compare various file systems and its operating systems examples

List of Experiments:

1. Execution of various file/directory handling commands in Linux.
2. To study the various commands operated in vi editor in LINUX.
3. To study the various File Access Permission and different types users in LINUX
4. Simulate First Come First Serve CPU scheduling algorithm.
5. Simulate Shortest Job First CPU scheduling algorithm.
6. Simulate Priority CPU scheduling algorithm.
7. Simulate Round Robin CPU scheduling algorithm.
8. Simulate Sequential file allocation strategy.
9. Simulate Linked file allocation strategy.
10. Simulate Indexed file allocation strategy.
11. Simulate First In First Out page replacement algorithm.
12. Simulate Least Recently used page replacement algorithm.
13. Simulate Optimal page replacement algorithm.
14. Write Programs to simulate free space management.
15. Simulate Bankers Algorithm for Dead Lock Avoidance.

IV SEMESTER	L	T	P	C
	-	-	3	1.5
20IT4L02 : DATA BASE MANAGEMENT SYSTEMS LAB				

COURSE OUTCOMES:

After the completion of the` course the students are able to

CO1: Define, manipulate and control data using Structured Query Language (SQL).
CO2: Enforce Database Integrity Constraints.
CO3: Implement SQL Queries using set operators, sub queries, nested queries, aggregate functions, other SQL functions and views.
CO4: Develop applications using various features of PL/SQL like Functions, Procedures, Packages, cursors and triggers.
CO5. Develop Database system to handle the real world problem.

LIST OF EXPERIMENTS:

1. DDL and DML Commands.
2. Restricting and storing the Data using Key constraints. And displaying Data from Multiple Tables using SELECT command.
3. Queries (along with sub Queries and nested Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSECT.
4. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP by, HAVING Clause.
5. Creation and dropping of Views.
6. Queries using Conversion functions (to char, to number and to date), string functions (Concatenation, lpad , rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next day, add months, last day, months between, least, greatest, trunc, round, to char, to date).
   (i) Creation of simple PL/SQL programs which includes declaration section, executable section and exception handling section.
   (ii) Insert data into tables and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
7. Develop a program that includes the features IF, NESTED IF, CASE and CASE expression.
8. Program development using simple loops, while loops, numeric for loops, nested loops.
9. ERROR Handling, BUILT–IN Exceptions, User defined Exceptions, RAISE- APPLICATION ERROR.
10. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
11. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
12. Program development using creation of package specification, package bodies, private objects, package variables and calling stored packages.
13. Develop programs using Cursors.
14. Develop Programs using Triggers.

IV SEMESTER	L	T	P	C
	-	-	3	1.5
20CC4L01 : CYBER SECURITY LAB				

Course Outcomes:

1. Analyze and implement Audit security policy in windows environment, create a Demilitarized zone creation in Network environment
2. Illustrate the Resource harvesting attack and mitigation, Window Patch management policy, Trojans and mitigation strategies
3. Apply the knowledge of metasploit, Access control list creation and content filtering limiting the traffic
4. Explain the Data leakage in a website database, Password policy and verification, Patch management using MBSA tool on windows machine
5. Build an Audit Policy management, Media handling policy and event log analysis and Installation of Trojan, Network DOS attack and proof of bandwidth utilization

Lab Experiments:

1. Audit security policy implementation in windows environment.
2. Create a Demilitarized zone creation in Network environment for information security.
3. Implement Resource harvesting attack and mitigation.
4. Implement Window Patch management policy.
5. Knowing the Behavior of Trojans and mitigation strategies.
6. Create a metasploit and make it to implement.
7. Access control list creation and content filtering limiting the traffic.
8. Data leakage in a website database and preventive measures.
9. Password policy implementations and verification.
10. Patch management implementation using MBSA tool on windows machine
11. Audit Policy management for users and computers log analysis.
12. Media handling policy implementation and event log analysis.
13. Installation of Trojan and study of different options.
14. Network DOS attack and proof of bandwidth utilization and preventive steps.

IV SEMESTER	L	T	P	C
	1	-	2	2
20CC4S01 : FULL STACK DEVELOPMENT LAB				

Course Objectives:

The objective of this lab is to provide understanding about the core concepts of frontend programming for web application and to build strong foundation of JavaScript which will help developer to apply JavaScript concepts for responsive web frontend development.

Course Outcomes:

By the end of this lab the student is able to

1. Analyze a web page and identify its elements and attributes.
2. Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet
3. Implement MVC and responsive design to scale well across PC, tablet and Mobile Phone
4. Create web pages using HTML and Cascading Style Sheets.
5. Develop major Web application tier- Client side development
6. Participate in the active development of cross-browser applications through JavaScript
7. Develop JavaScript applications that transition between states

Perform experiments related to the following concepts:

A) HTML

1) Introduction to HTML
2) Browsers and HTML
3) Editor's Offline and Online
4) Tags, Attribute and Elements
5) Doctype Element
6) Comments
7) Headings, Paragraphs, and Formatting Text
8) Lists and Links
9) Images and Tables

B) CSS

1) Introduction CSS
2) Applying CSS to HTML
3) Selectors, Properties and Values
4) CSS Colours and Backgrounds
5) CSS Box Model
6) CSS Margins, Padding, and Borders
7) CSS Text and Font Properties
8) CSS General Topics

C) Java Script

1) Introduction to JavaScript
2) Applying JavaScript (internal and external)
3) Understanding JS Syntax
4) Introduction to Document and Window Object
5) Variables and Operators
6) Data Types and Num Type Conversion
7) Math and String Manipulation
8) Objects and Arrays
9) Date and Time
10) Conditional Statements
11) Switch Case
12) Looping in JS
13) Functions

IV SEMESTER	L	T	P	C
	1	-	-	-
20BM4M01 : INDIAN CONSTITUTION				

UNIT I: Introduction to Indian Constitution-Constitution meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT II: Union Government and Administration Structure of the Indian Union: Federalism, Centre State relationship, President: Role, powers and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions

UNIT III: State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT IV: Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions of Pachayat Raj Institution: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

UNIT V: Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate -State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women.

TEXTBOOKS:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice Hall of India Pvt. Ltd.
2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics

REFERENCE BOOKS:

1. D.C. Gupta, Indian Government and Politics
2. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
3. J.C. Johari, Indian Government andPolitics Hans
4. J. Raj IndianGovernment and Politics
5. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
6. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012.

e-Resources:

1) nptel.ac.in/courses/109104074/8
2) nptel.ac.in/courses/109104045/
3) nptel.ac.in/courses/101104065/
4) www.hss.iitb.ac.in/en/lecture-details
5) www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

V SEMESTER	L	T	P	C
	3	-	-	3
20CS5T01 : COMPUTER NETWORKS				

COURSE OUTCOMES:

At the end of the course students are able to

1. Classify network reference models such as OSI, TCP/IP. (K2)
2. Apply Data Link Layer protocols for Error detection and correction. (K4)
3. Distinguish various MAC sub layer Protocols such as ALOHA, CSMA, CSMA/CD. (K4)
4. Identify various Network layer and Transport layer protocols. (K3)
5. Illustrate various application layer protocols such as WWW and HTTP etc. (K2)

UNIT 1:

Data Communication: Components, Data Representation, Data flow (Simplex, Half-duplex and Full-Duplex), Types of connections: Point to Point and Multipoint, Various Categories of Topologies, Categories of Networks, Protocols and Standards, OSI network model, TCP/IP Protocol Suite, Transmission Media (Twisted pair cable, Coaxial cable and Fiber-optic cable).

UNIT 2:

Data Link Layer: Error Detection and Error Correction -Introduction, Block coding: Error Detection, Error Correction, Hamming Distance, Minimum Hamming Distance, Cyclic Codes: Cyclic Redundancy check (CRC), Checksum, Framing, Flow control and Error control.

UNIT3:

Medium Access Sub Layer: Random Access protocols – ALOHA, Pure ALOHA, Slotted ALOHA, Carrier Sense Multiple Access (CSMA),1-persistent CSMA, Non-persistent CSMA, p-Persistent CSMA, CSMA/CD, CDMA/CA.

Network Layer: Logical addressing – IPV4 Addresses: Classful and Classless Addressing, Subnetting, Network Address Translation (NAT), IPV6 Addresses-Structure and Address space, Address Mapping: ARP, RARP, BOOTP and DHCP.

UNIT 4:

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), UDP Format, uses of UDP, Transmission Control Protocol (TCP), TCP Services, TCP Features, TCP Segment, Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT 5:

Application Layer: Domain Name System (DNS), Domain Name Space, Distribution of Name Space, Remote Logging: TELNET, ELECTRONIC MAIL, SMTP, File Transfer Protocol (FTP), WWW, HTTP.

TEXT BOOKS:

1. Data Communication and Networking, 5th Edition, Behrouz A. Forouzan, McGrawHill, 2017.
2. Computer Networks, 6th Edition, Andrew S. Tanenbaum, Pearson New International Edition, 2021.
3. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India, 2017.

REFERENCE BOOKS:

1. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.

TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, USA.

V SEMESTER	L	T	P	C
	3	-	-	3
20IT5T02 : ARTIFICIAL INTELLIGENCE				

COURSE OUTCOMES

After the completion of the course the students are able to

1. Outline the fundamentals of AI techniques and search techniques. (K2)
2. Identify appropriate search algorithms for any AI problem. (K3)
3. Illustrate a problem using first order and predicate logic. (K2)
4. Summarize the concepts of non-monotonic reasoning. (K2)
5. Acquire the knowledge of various AI applications. (K4)

UNIT - I Introduction

Artificial Intelligence definition, AI problems, Problem Spaces, Defining the Problem as a State Space Search, problem characteristics, production Systems. Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

UNIT - II Problem solving Methods

Issues in the design of search programs, Search Strategies- Uninformed (Breadth-First, Depth-First Search), Informed (Heuristic) - Local Search Algorithms and Optimization Problems Generate-And-Test, Hill Climbing, Best-First Search, A* Algorithm, Problem Reduction, AO*Algorithm) - Constraint Satisfaction Problems, Backtracking Search - Game Playing - Optimal Decisions in Games – Minimax Search, Alpha - Beta Pruning - Stochastic Games

UNIT - III Knowledge Representation

Representing Simple Facts in Predicate Logic, First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution, Natural Deduction – Knowledge Representation - Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information

UNIT - IV Uncertain Knowledge and Reasoning

Introduction to Non-Monotonic Reasoning, acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use, Representing Knowledge in an Uncertain Domain, Probability and Bayes Theorem, The Semantics of Bayesian Networks

UNIT - V Applications

AI applications – Language Models – Information Retrieval- Information Extraction – Expert Systems – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving

Text Books:

1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach‖, Prentice Hall, Third Edition, 2009.
2. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011
3. Elaine Rich, Kevin Knight, Shiva Sankar B. Nair, Artificial Intelligence, The McGraw Hill publications, Third Edition, 2017.
4. Bratko, Prolog: Programming for Artificial Intelligence‖, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

Reference Books:

1. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.
2. David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge University Press 2010.
3. Dan W Patterson, Introduction to Artificial Intelligence & Expert Systems, PHI, 2010.

Web Resources:

1. https://nptel.ac.in/courses/106105077
2. https://nptel.ac.in/courses/106106126
3. https://aima.cs.berkeley.edu
4. https://ai.berkeley,edu/project_overview.html

V SEMESTER	L	T	P	C
	3	-	-	3
20CC5T01 : INTERNET OF THINGS				

Course outcomes:

After this completion of this course, the student should be able to

1. Outline the concepts of IoT and apply IoT to different applications. (K2)
2. Utilization of Devices, Gateways and Data Management in IoT. (K3)
3. Analyze and evaluate protocols used in IoT. (K4)
4. Identify how IoT differs from traditional data collection systems. (K3)
5. Illustrate the role of big data, cloud computing and data analytics in a typical IoT system. (K2)

UNIT - I

The Internet of Things: An Overview of Internet of things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples of IoTs, Design Principles For Connected Devices Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

UNIT - II

Business Models for Business Processes in the Internet of Things, IoT/M2M systems layers and designs standardizations, Modified OSI Stack for the IoT/M2M Systems ,ETSI M2Mdomains and High-level capabilities, Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability.

UNIT - III

Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT - IV

Data Acquiring, Organizing and Analytics in IoT/M2M, Applications /Services /Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT - V

Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2MApplications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively(Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology, Sensing the World.

Text Books:

1. Rajkamal, Internet of Things: Architecture, Design Principles and Applications, McGraw Hill Higher Education.
2. A.Bahgya and V.Madisetti, Internet of Things, Univesity Press, 2015

References:

1. Adrian McEwen and Hakim Cassimally, Designing the Internet of Things, Wiley
2. CunoPfister, Getting Started with the Internet of Things Oreilly

V SEMESTER (Professional Elective-I)	L	T	P	C
	3	-	-	3
20CC5E01 : CYBER LAWS AND SECURITY POLICIES				

Course Objectives:

1. To understand the computer security issues
2. To make secure system planning, policies

Course outcomes:

After this completion of this course, the student should be able to

1. Understand the Legal Framework of Cyber Laws.
2. Analyze Cybercrime and Legal Issues.
3. Develop and Implement Security Policies.
4. Apply Information security fundamentals and Tools of information security.
5. Outline the role of information security professionals.

UNIT- I :

Introduction to Computer Security: Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity.

UNIT-II:

Secure System Planning and administration: Introduction to the orange book, Security policy requirements, accountability, assurance and documentation requirements, Network Security, The Red book and Government network evaluations.

UNIT-III:

Information security policies and procedures: Corporate policies- Tier 1, Tier 2 and Tier3 policies – process management-planning and preparation-developing policies-asset classification policy developing standards.

UNIT- IV:

Information security: Fundamentals-Employee responsibilities- information classification Information handling- Tools of information security- Information processing-secure program administration.

UNIT-V:

Organizational and Human Security: Adoption of Information Security Management Standards, Human Factors in Security- Role of information security professionals.

Text Book:

1. Debby Russell and Sr. G. T Gangemi, "Computer Security Basics (Paperback)", 2nd Edition, O' Reilly Media, 2006.

References:

1. Thomas R. Peltier, "Information Security policies and procedures: A Practitioner's Reference", 2nd Edition Prentice Hall, 2004.
2. Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions", IGI Global, 2009.
3. Thomas R Peltier, Justin Peltier and John blackley, "Information Security Fundamentals", 2nd Edition, Prentice Hall, 1996.
4. Jonathan Rosenoer, "Cyber law: the Law of the Internet", Springer-verlag, 1997.
5. James Graham, "Cyber Security Essentials" Averbach Publication T & F Group.

V SEMESTER (Professional Elective-I)	L	T	P	C
	3	-	-	3
20CC5E02 : SOCIAL NETWORKS AND SEMANTIC WEB				

Course Objectives:

1. To learn Web Intelligence
2. To learn Knowledge Representation for the Semantic Web
3. To learn Ontology Engineering
4. To learn Semantic Web Applications, Services and Technology
5. To learn Social Network Analysis and semantic web

Course outcomes:

After this completion of this course, the student should be able to

1. Demonstrate social network analysis and measures.
2. Analyze random graph models and navigate social networks data.
3. Apply the network topology and Visualization tools.
4. Analyze the experiment with small world models and clustering models.
5. Compare the application driven virtual communities from social network Structure.

UNIT I:

Web Intelligence: Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT II:

Knowledge Representation for the Semantic Web: Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

UNIT III:

Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT IV:

Semantic Web Applications, Services and Technology: Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

UNIT V:

Social Network Analysis and semantic web: What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features.

Text Books:

1. Thinking on the Web – Berners Lee, Godel and Turing, Wiley inter science, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

Reference Books:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J. Davies, R. Studer, P. Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O'Reilly, SPD.

V SEMESTER (Professional Elective-I)	L	T	P	C
	3	-	-	3
20IT5E02 : SOFTWARE PROJECT MANAGEMENT				

Course Outcomes:

Upon the completion of the course students will be able to:-

1. Apply the process to be followed in the software development life-cycle models. (K3)
2. Outline the concepts of project management & planning. (K2)
3. Test for project plans through managing people, communications and change (K4)
4. Examine the activities necessary to successfully complete and close the Software projects. (K4)
5. Illustrate communication, modeling and construction and deployment practices in software development. (K2)

UNIT – I:

Conventional Software Management: The waterfall model, conventional software Management performance.

Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT – II:

The Old Way and The New: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life Cycle Phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of The Process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT – III:

Model Based Software Architectures: A Management perspective and technical perspective.

Work Flows of the Process: Software process workflows, Iteration workflows.

Checkpoints of the Process: Major mile stones, Minor Milestones, Periodic status assessments.

UNIT – IV:

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

UNIT – V:

Process Automation: Automation Building blocks, The Project Environment.

Project Control and Process Instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Project Estimation and Management: COCOMO model, Critical Path Analysis, PERT technique, Monte Carlo approach (Text book 2)

Text Books:

1) Walker Royce, Software Project Management, Pearson Education, 2005.
2) Bob Hughes, Software Project Management, 4th edition, Mike Cotterell, TMH.

Reference Books:

1) Joel Henry, Software Project Management, Pearson Education.
2) Pankaj Jalote, Software Project Management in practice, Pearson Education, 2005.
3) Robert K.Wysocki, Effective Software Project Management, Wiley,2006.

V SEMESTER (Professional Elective-I)	L	T	P	C
	3	-	-	3
20CC5E03 : OBJECT ORIENTED SOFTWARE ENGINEERING				

COURSE OUTCOMES:

After the completion of this course, students will be able to

1. Outline about software development process models (K2)
2. Analyze the planning and scheduling of a software project (K4)
3. Summarize the object oriented analysis (K2)
4. Illustrate the design concepts and principles (K2)
5. Identify the testing methods and comparison of various testing techniques. (K3)

UNIT- I Introduction

Introduction to Software Engineering - Software Development process models – Agile Development - Project & Process - Project management - Process & Project metrics - Object Oriented concepts, Principles & Methodologies.

UNIT- II Planning& Scheduling

Software Requirements Specification, Software prototyping - Software project planning - Scope - Resources - Software Estimation - Empirical Estimation Models – Planning - Risk Management - Software Project Scheduling - Object Oriented Estimation & Scheduling.

UNIT-III Analysis

Analysis Modeling - Data Modeling - Functional Modeling & Information Flow - Behavioral Modeling-Structured Analysis - Object Oriented Analysis - Domain Analysis-Object oriented Analysis process - Object Relationship Model - Object Behavior Model, Design modeling with UML.

UNIT-IV Design

Design Concepts & Principles - Design Process - Design Concepts - Modular Design - Design Effective Modularity - Introduction to Software Architecture - Data Design - Transform Mapping - Transaction Mapping - Object Oriented Design - System design process- Object design process –Design Patterns.

UNIT -V Implementation, Testing & Maintenance

Top - Down, Bottom-Up, object oriented product Implementation & Integration. Software Testing methods-White Box, Basis Path-Control Structure - Black Box - Unit Testing - Integration testing - Validation & System testing - Testing Tools – Software Maintenance & Reengineering.

Text Books:

1. Roger. S. Pressman and Bruce R. Maxim, “Software Engineering – A Practitioner’s Approach”, seventh Edition, McGraw Hill,2015.
2. Ian Sommerville, “Software Engineering”, eighth edition, Pearson Education, New Delhi, 2011.
3. Bill Brykczynski, Richard D. Stutz ,”Software Engineering Project Management”, Wiley India Edition, IEEE computer society, 2007.
4. Craig Larman, Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development (3rd Edition), Pearson Education, 2008.

References:

1. Fairley R, “Software Engineering Concepts”, second edition, Tata McGraw Hill, New Delhi,2003.
2. Jalote P, “An Integrated Approach to Software Engineering”, third edition, Narosa Publishers, New Delhi, 2013.
3. Grady Booch, James Rumbaugh, Ivar Jacobson - "the Unified Modeling Language User Guide" - Addison Wesley, 1999.
4. Ali Bahrami, “Object Oriented Systems Development” 1st Edition, The McGraw-Hill Company, 1999.

V SEMESTER (JOB ORIENTED ELECTIVE-I)	L	T	P	C
	3	-	-	3
20IT5J01 : LINUX ADMINISTRATION				

Course Outcomes:

At the end of the course, the students will be able to:

1. Illustrate various Linux commands that are used to manipulate system operations at admin level. (K2)
2. Construct Shell Programming using Linux commands. (K3)
3. Develop applications to manipulate internal kernel level Linux File System. (K3)
4. Summarize the concepts of user, group and storage management. (K2)
5. Construct SSH client and server. (K3)

UNIT – I

Introduction To Linux And Linux Utilities: A brief history of LINUX, architecture of LINUX, features of LINUX, introduction to vi editor. Linux commands- PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, unlink, du, find, unmask, ulimit, ps, finger, tail, head, sort, nl, uniq, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio, apt.

UNIT – II

Introduction to Shells: Linux Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization.

Filters: Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines, Comparing Files.

UNIT - III

Grep: Operation, grep Family (grep, egrep, fgrep), Searching for File Content.

Sed: Scripts, Operation, Addresses, commands, Applications, grep and sed.

Unix File Structure: Introduction to UNIX file system, inode (Index Node), file descriptors, system calls and device drivers.

UNIT – IV

User and Group Management: User accounts, local groups and group memberships, Configure networking and hostname resolution statically or dynamically, start, stop, and check the status of network services and network related commands.

Storage Management: List, create, delete, and modify physical storage partitions and tools

UNIT – V

Configuring SSH: Enabling the SSH Server, Using the SSH Client, Configuring Key- Based SSH Authentication, Using Graphical Applications with SSH.

Practical Learning: Installation of Any open source Linux Distribution, AWS Instance Creation and Learn How to Access through SSH.

TEXT BOOKS:

1. W. Richard. Stevens, Advanced Programming in the UNIX Environment, 3rd edition, Pearson Education, New Delhi, India.

2. Behrouz A. *Forouzan, Richard F. Gilberg*, Unix and shell Programming Thomson

REFERENCES:

1. *Robert Love, O'Reilly*, Linux System Programming, SPD.

2. *W.R.Stevens*, Advanced Programming in the UNIX environment, 2nd Edition, Pearson Education.

3. *W.R. Stevens*, UNIX Network Programming, PHI.

4. *Graham Glass, King Ables*, UNIX for Programmers and Users, 3rd Edition, Pearson Education.

V SEMESTER (JOB ORIENTED ELECTIVE-I)	L	T	P	C
	3	-	-	3
20CC5J01 : R PROGRAMMING				

Course Outcomes:

At the end of the course, the students will be able to:

1. Illustrate the fundamentals, standards of Functions and capabilities of R Language.
2. Summarize the basic R-Language Constructs.
3. Apply the Principals of Graphics and R-Base Graphics
4. Develop applications and Performing T-Testing
5. Design and build Linear optimization

UNIT – I

INTRODUCTION OF R-LANGUAGE:

Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

UNIT II

FUNCTIONS AND STRUCTURES:

R Programming Structures, Control Statements, Loops, - Looping Over Non-vector Sets, If-Else, Arithmetic and Boolean Operators, Default Values for Argument, Return Values, Functions with No Pointers in R, Recursion, Sorting and Searching.

UNIT III

R-BASE GRAPHICS:

Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function Customizing Graphs, Saving Graphs to Files.

UNIT IV

T-TESTING:

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.

UNIT V

LINEAR OPTIMIZATION:

Linear Models, Simple Linear Regression and Multiple Regression, Generalized Linear Models, Nonlinear Models, Splines- Decision- Random Forests.

TEXT BOOKS

1. The Art of R Programming, Norman Matloff, Cengage Learning: Efficient R Programming: A Practical Guide to Smarter Programming 1st Edition – Colin Gillespie & Robin Lovelace - First Edition.
2. Jared P. Lander, R for Everyone: Advanced Analytics and Graphics, Second Edition 2017.

REFERENCES

1. R Cookbook, PaulTeetor, Oreilly: R Cookbook [R CKBK] [Paperback] R Cookbook [RKBK] [Paperback]Mar 31, 2011 by Paul Teetor.
2. R in Action,Rob Kabacoff, Manning: R in Action: Data Analysis and Graphics with RNov 5, 2018 Unabridged by Robert Kabacoff and Dale Ogden.

V SEMESTER	L	T	P	C
	-	-	3	1.5
20CC5L01 : ARTIFICIAL INTELLIGENCE LAB				

Course Outcomes

After the completion of the course the students are able to

1. Outline the concept of Artificial intelligence. (K2)
2. Apply various search algorithms of artificial intelligence. (K3)
3. Examine the knowledge representation and reasoning techniques. (K4)
4. Apply different types of techniques to solve the traditional computational problems. (K3)

List of Experiments

1. Write a program in prolog to implement simple facts and Queries
2. Write a program in prolog to implement simple arithmetic
3. Write a program in prolog to solve Monkey banana problem
4. Write a program in prolog to solve Tower of Hanoi
5. Write a program in prolog to solve 8 Puzzle problems
6. Write a program in prolog to solve Traveling salesman problem
7. Write a python program to implement simple Chatbot?
8. Write a python program to implement Breadth First Search Traversal?
9. Write a python program to implement Depth First Search Traversal?
10. Write a python program to implement Water Jug Problem?
11. Write a program to implement Tic-Tac-Toe game using python.
12. Write a program to implement Missionaries and Cannibals problem using python.

V SEMESTER	L	T	P	C
	-	-	3	1.5
20CC5L02 : INTERNET OF THINGS LAB				

COURSE OUTCOMES: Students will be able to

1. Analyze temperature and humidity using various sensors (K4)
2. Apply IR sensor/push button to on/off LED (K3)
3. Build a Bluetooth module with Arduino and Use the same (K3)
4. Construct Actuating elements with Arduino and control the same (K3)

List of Experiments

1. Familiarization with Arduino and perform necessary software installation.
2. To interface LED/Buzzer with Arduino and write a program to turn ON LED for 1 sec after every 2 seconds.
3. To interface Push button/Digital sensor (IR/LDR) with Arduino and write a program to turn ON LED when push button is pressed or at sensor detection.
4. To interface DHT11 sensor with Arduino and write a program to print temperature and humidity readings.
5. To interface motor using relay with Arduino and write a program to turn ON motor when push button is pressed.
6. To interface OLED with Arduino and write a program to print temperature and humidity readings on it.
7. To interface Bluetooth with Arduino and write a program to send sensor data to smart phone using Bluetooth.
8. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when ‘1’/’0’ is received from smart phone using Bluetooth.
9. To interface Servo motor with Arduino and write a program to control the same
10. To interface Stepper motor with Arduino and write a program to control the same using potentiometer
11. To interface thermistor with Arduino for temperature measurement
12. To measure temperature using thermocouple by interfacing it with Arduino
13. Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
14. Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.

V SEMESTER	L	T	P	C
	2	-	-	-
20BM5M01 :: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE				

SYLLABUS

1. Basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.
2. Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature.
3. Introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system.
4. Basics of Indian Traditional knowledge modern scientific perspective.
5. Basic Structure of Indian Knowledge System
6. Modern Science and Indian Knowledge System
7. Yoga and Holistic Health care
8. Case Studies.

Text Books

1. GN Jha (Eng. Trans.) Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakasham, Delhi,2016.
2. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016.
3. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014.

Reference Books

1. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
2. V N Jha (Eng. Trans,), Tarkasangraha of Annam Bhatta, Inernational Chinmay Foundation, Velliarnad,Amaku,am
3. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta.
4. P R Sharma (English translation), Shodashang Hridayam.

E-Resources

1. https://www.youtube.com/watch?v=sSgj_GZOwU8

V SEMESTER	L	T	P	C
	1	-	2	2
20HS5S01 :: Skill Course-3 (ADVANCED COMMUNICATION SKILLS LAB)				

At the end of the course students will be able to prepare themselves for their career which may require them to listen and speak in English both for their professional and interpersonal communication in the globalized context.

Course objectives

- Analyzing a topic of discussion and relating to it.
- Planning and executing an assignment creatively.
- Presenting ideas coherently within a stipulated time.
- Communicating ideas effectively in prescribed oral activities.
- Applying relevant writing formats for resume and presentations.
- Facing interviews with confidence.

Course outcomes

At the end of the course students will be able to

- Summarize ideas and organize information relevantly and coherently. (K2)
- Prove in group discussions and face interviews with confidence. (K5)
- Build resume with covering letter.(K3)
- Plan oral presentations and public speaking. (K3)
- Take part in social and professional communication. (K4)

SYLLABUS

The following course content is prescribed for the **Advanced English Communication Skills Lab:**

UNIT I

Communication Skills

- Introduce Yourself
- JAM
- J2M

➢ Identifying one's career objective, projecting strengths and skills, organization of ideas within given time.

UNIT II

Interaction Skills

- Body Language
- Role- Plays

➢ Students start a conversation - Respond appropriately and relevantly in different situations with right body language.

UNIT III

Oral Skills

- Presentations
- Public Speaking

- Planning preparation and presentation - organization of ideas with clarity , coherence and style.

UNIT IV

Writing Skills

- Covering Letter
- Resume Writing

- To communicate the ideas relevantly and coherently in writing.

UNIT V

Team Work Skills

- Group Discussion

- Dynamics of Group Discussion - Modulation of voice, Body language , relevance , fluency and coherence.

UNIT VI

Interview Skills

- Pre-interview planning, opening strategies, answering strategies, interview through tele and video conference.

Reference Books:

1. Ashraf Rizvi- Effective Technical Communication - McGraw Hill Education- 2017.
2. MadhaviApte - A Course in English Communication – Prentice - Hall of India- 2007.
3. Dr. ShaliniVerma - Body Language – Your Success Mantra- S. Chand- 2006.
4. Sunita Mishra &C.Murali Krishna- Communication Skills for Engineers - Pearson Education - 2007.

VI SEMESTER	L	T	P	C
	3	-	-	3
20CC6T01 : CRYPTOGRAPHY AND NETWORK SECURITY				

Course Outcomes:

At the end of the course, student will be able to

1. List out the different security threats and counter measures and foundation course ofcryptography mathematics. (K1)
2. Classify the basic principles of symmetric key algorithms and operations of some symmetric key algorithms and asymmetric key cryptography (K2)
3. Illustrate the basic principles of Public key algorithms and Working operations ofsome Asymmetric key algorithms such as RSA, ECC and some more (K2)
4. Design applications of hash algorithms, digital signatures and key management techniques (K6)
5. Determine the knowledge of Application layer, Transport layer and Network layer security Protocols such as PGP, S/MIME, SSL, TSL, and IPsec. (K5)

UNIT I:

Basic Principles: Security Goals, Security Attacks, Security Services, Security Mechanisms, Symmetric Cipher Model, Substitution Techniques, Transposition Technique, Phishing and Defensive Measure, Web-Based Attacks, Structured Query Language(SQL) Injection attacks.

UNIT II:

Traditional Block Cipher Structure: Stream Cipher and Block Cipher.
Symmetric Encryption: Mathematics of Symmetric Key Cryptography, Introduction to Modern Symmetric Key Ciphers, Data Encryption Standard, IDEA(International Data Encryption Algorithm),Advanced Encryption Standard.

UNIT III:

Asymmetric Encryption: Mathematics of Asymmetric Key Cryptography, Asymmetric Key Cryptography, RSA Algorithm, Algorithm for Diffe-Hellman Key Exchange, Elliptic Curve Cryptography.

UNIT IV:

Data Integrity, Digital Signature Schemes & Key Management: Hash Function, Applications of Cryptographic Hash Functions, SHA(Secure Hash Algorithm),Message Integrity and Message Authentication, , Digital Signature, Key Management and Distribution.

UNIT V:

Network Security-I: Remote User Authentication Principles, Kerberos, Web Security, Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSLand TLS
Network Security-II: Secure Shell(SSH)**,**Security at the Network Layer: IPSec, System Security

Text Books:

1. Cryptography and Network Security, 3rd Edition Behrouz A Forouzan, Deb deep Mukhopadhyay, McGraw Hill, 2015
2. Cryptography and Network Security,4th Edition, William Stallings, (6e) Pearson,2006
3. Everyday Cryptography, 1st Edition, Keith M. Martin, Oxford,2016

Reference Books:

1. Network Security and Cryptography, 1st Edition, Bernard Meneges, CengageLearning, 2018

VI SEMESTER	L	T	P	C
	3	-	-	3
20IT6T01 : MACHINE LEARNING				

COURSE OUTCOMES

After the completion of the course the students are able to

1. Illustrate the fundamentals of machine learning concepts. (K2)
2. Develop and apply regression and classification algorithms. (K3)
3. Build a model for decision tree learning. (K3)
4. Discover the Bayesian approach for machine learning. (K4)
5. Apply unsupervised learning models for handling unknown pattern. (K3)

Unit-1 Introduction

Well-Posed learning problems, Basic concepts, Types of Machine Learning-Supervised, unsupervised and reinforcement. Goals and applications of machine learning, Aspects of developing a learning system: training data, concept representation, function approximation. Concept learning Introduction, Version Spaces and the Candidate Elimination Algorithm.

Unit-2 Supervised Learning

Regression: Linear regression, polynomial regression, metrics for accessing regression, Overfitting-Underfitting problems, The bias / Variance tradeoff.

Classification: KNN, SVM-Optimal Separation-Kernels-Kernel Optimization, Linear Discriminant Analysis, metrics for accessing classification

Unit-3 Decision Tree Learning

Decision tree representation, appropriate problems for decision tree learning, Univariate Trees (Classification and Regression), Multivariate Trees, Basic Decision Tree Learning algorithms, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning, Random Forest

Unit-4 Bayesian Learning

Bayes theorem and concept learning, Bayes optimal classifier, Gibbs algorithms, Naive Bayes Classifier, Bayesian belief networks, The EM algorithm, Gaussian Mixture Model, MLE and Bayesian Estimate

Unit-5 Unsupervised Learning:

Curse of Dimensionality, Dimensionality Reduction Techniques, Principal component analysis, Singular Value Decomposition. Introduction to clustering, Hierarchical: AGNES, DIANA, Partitional: K-means clustering, K-Mode Clustering, Hierarchical, Spectral, subspace clustering, Association rule mining.

Text Books:

1) Peter Flach, Machine Learning-The Art and Science of Algorithms that Make Sense of Data, Cambridge University Press, 2017

2) T.M. Mitchell, "Machine Learning", McGraw-Hill, 1997.

3) Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, "Machine Learning", Pearson, 2019.

Reference Books:

1) Ethern Alpaydin, "Introduction to Machine Learning", MIT Press, 2004.

2) Stephen Marsland, "Machine Learning -An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

3) Andreas C. Müller and Sarah Guido "Introduction to Machine Learning with Python: A Guide for Data Scientists", Oreilly.

e-Resources:

1) Andrew Ng, "Machine Learning Yearning" https://www.deeplearning.ai/machine-learning-yearning/

2) Shai Shalev-Shwartz, Shai Ben-David, "Understanding Machine Learning: From Theory to Algorithms", Cambridge University Press

https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html

VI SEMESTER	L	T	P	C
	3	-	-	3
20CC6T02 : CYBER CRIME INVESTIGATION & DIGITAL FORENSICS				

COURSE OUTCOMES

After the completion of the course the students are able to

1. Acquire the definition of computer forensics fundamentals.
2. Describe the types of computer forensics technology
3. Analyze various computer forensics systems.
4. Illustrate the methods for data recovery, evidence collection and data seizure.
5. Summarize duplication and preservation of digital evidence.

UNIT I

Introduction: Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime: Social Engineering, Categories of Cyber Crime, Property Cyber Crime.

UNIT II

Cyber Crime Issues: Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation, Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses.

UNIT III

Investigation: Introduction to Cyber Crime Investigation, Investigation Tools, e- Discovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies. Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking.

UNIT IV

Digital Forensics: Introduction to Digital Forensics, Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics.

UNIT V

Role of CRET-In Cyber Security: Computer Security Incident Response (Reactive) – Computer Security Incident Prevention (Proactive) – Security Quality Management Services, CERT-In Security Guidelines- Web server, database server, Intrusion Detection system, Routers, Standard alone system, networked System, IT Security polices for government and critical sector organizations.

Text Books:

1. Nihad A. Hassan, ―Digital Forensics Basics: A Practical Guide Using Windows OS Paperback‖, February 26, 2019.

Reference Books:

1. Nelson Phillips and EnfingerSteuart, ―Computer Forensics and Investigations‖, Cengage Learning, New Delhi, 2009.
2. Kevin Mandia, Chris Prosise, Matt Pepe, ―Incident Response and Computer Forensics―, Tata McGraw-Hill, New Delhi, 2006.
3. Robert M Slade,‖ Software Forensics‖, Tata McGraw - Hill, New Delhi, 2005

VI SEMESTER (Professional Elective-II)	L	T	P	C
	3	-	-	3
20CC6E01 : DATA PRIVACY				

COURSE OUTCOMES

After the completion of the course the students are able to

1. Summarize the basic concepts of web security and privacy, hardware and software vulnerabilities and protection mechanisms.
2. Analyze the need for data privacy and the related technologies.
3. Apply the privacy protection models like null map, k-map, wrong-map.
4. Illustrate the practices and policies for computing privacy and risk measurements.
5. Discover the protection mechanisms against several data related attacks.

Unit I:
Introduction to Security: Cryptography, Web security, Hardware and software vulnerabilities

Unit II:
Data Privacy: Data localization issues, Managing personally identifiable or sensitive information, Hippocratic databases, Differential privacy, Privacy preserving data analysis

Unit III
Basic concepts and definitions, objectives, disclosure control and inference of entities, models of protection like null map, k-map, wrong-map

Unit IV
Data Explosion: Availability vs. Storage vs. Collection trade-off, barriers to distribution, mathematical models for sharing practices and policies for computing privacy and risk measurements

Unit V
Demographics and Uniqueness, data linking, data profiling, data privacy attacks

Text Books:
1. Stallings, W. Cryptography and Network Security. Pearson Education India.
2. Giannotti, F., &Pedreschi, D. (Eds.). Mobility, data mining and privacy: Geographic knowledge discovery. Springer Science & Business Media.
3. Bygrave, L. A. Data privacy law: an international perspective (Vol. 63). Oxford: Oxford University Press.
4. Scoble, R., Israel, S., &Benioff, M. R.. Age of context: Mobile, sensors, data and the future of privacy. USA: Patrick Brewster Press.
5. Bendat, J. S., &Piersol, A. G. Random data analysis and measurement procedures.

VI SEMESTER (Professional Elective-II)	L	T	P	C
	3	-	-	3
20CC6E02 : INTRUSION DETECTION AND PREVENTION SYSTEM				

COURSE OUTCOMES

After the completion of the course the students are able to

1. Understand when, where, how, and why to apply Intrusion Detection tools and techniques in order to improve the security posture of an enterprise.
2. Apply knowledge of the fundamentals and history of Intrusion Detection in order to avoid common pitfalls in the creation and evaluation of new Intrusion Detection Systems
3. Analyze intrusion detection alerts and logs to distinguish attack types from false alarms
4. Explain the fundamental concepts of Network Protocol Analysis and demonstrate the skill to capture and analyze network packets.
5. Use various protocol analyzers and Network Intrusion Detection Systems as security tools to detect network attacks and troubleshoot network problems.

UNIT I:
History of Intrusion detection, Audit, Concept and definition , Internal and external threats to data, attacks, Need and types of IDS, Information sources Host based information sources, Network based information sources.

UNIT II:
Intrusion Prevention Systems, Network IDs protocol based IDs ,Hybrid IDs, Analysis schemes, thinking about intrusion. A model for intrusion analysis , techniques Responses requirement of responses, types of responses mapping responses to policy Vulnerability analysis, credential analysis non credential analysis.

UNIT III:
Introduction to Snort, Snort Installation Scenarios, Installing Snort, Running Snort on Multiple Network Interfaces, Snort Command Line Options. Step-By-Step Procedure to Compile and Install Snort Location of Snort Files, Snort Modes Snort Alert Modes.

UNIT IV:
Working with Snort Rules, Rule Headers, Rule Options, The Snort Configuration File etc. Plug-in, Preprocessors and Output Modules, Using Snort with MySQL

UNIT V:
Using ACID and Snort Snarf with Snort, Agent development for intrusion detection, Architecture models of IDs and IPs.

Text Books:
1. Rafeeq Rehman : " Intrusion Detection with SNORT, Apache, MySQL, PHP and ACID," 1st Edition, Prentice Hall , 2003.

Reference Books:
1. Christopher Kruegel,Fredrik Valeur, Giovanni Vigna: "Intrusion Detection and Correlation Challenges and Solutions", 1st Edition,Springer, 2005.

2. Carl Endorf, Eugene Schultz and Jim Mellander " Intrusion Detection & Prevention", 1st Edition, Tata McGraw-Hill, 2004.
3. Stephen Northcutt, Judy Novak : "Network Intrusion Detection", 3rd Edition, New Riders Publishing, 2002.
4. T. Fahringer, R. Prodan, "A Text book on Grid Application Development and Computing Environment". 6th Edition, KhannaPublihsers, 2012.

VI SEMESTER (Professional Elective – II)	L	T	P	C
	3	-	-	3
20IT6E01 : DESIGN AND ANALYSIS OF ALGORITHMS				

Course Outcomes

After the completion of the course the students are able to

1. Analyze the asymptotic runtime complexity of algorithms for real world problems developed using different algorithmic methods. (K4)
2. Identify the optimal solutions by using advanced design and analysis of algorithm techniques like Divide & conquer and greedy method. (K3)
3. Illustrate the fundamentals of Dynamic Programming methods along with its applications. (K2)
4. Apply the search space and optimization problem techniques like backtracking and branch and bound method to solve problems optimally where advanced algorithm design techniques fail to find solution. (K3)
5. Distinguish the problems and its complexity as polynomial and NP problems and can formulate some real world problems to abstract mathematical problems. (K4)

UNIT-I

Introduction: Algorithm, Pseudo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic Analysis. **Disjoint Sets** - disjoint set operations, union and find algorithms, spanning trees, connected components and bi-connected components.

UNIT-II

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Stassen's matrix multiplication.

Greedy method: General method, applications, Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees and Single source shortest path problem.

UNIT – III

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem and Reliability design.

UNIT-IV

Backtracking: General method, Applications- n-queen problem, sum of subsets problem, graph coloring and Hamiltonian cycles.

Branch and Bound: General method, applications - Travelling sales person problem,0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

UNIT-V

NP- Hard and NP- complete problems: NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem.

Text Books:

1. Ellis Horowitz, SatrajSahni and Rajasekharam, Fundamentals of Computer Algorithms, Universities Press.
2. Steven S. Skiena, The Algorithm Design Manual, 2nd edition, Springer.
3. T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, Introduction to Algorithms, second edition, PHI Pvt. Ltd.

Reference Books:

1. AnanyLevitin, Introduction to the Design and Analysis of Algorithms, PEA
2. Parag Himanshu Dave, Himansu B Alachandra Dave, Design and Analysis of Algorithms, Pearson Education.
3. R.C.T. Lee, S.S.Tseng, R.C.Chang and T.Tsai, Introduction to Design and Analysis of Algorithms A strategic approach, McGraw Hill.
4. Aho, Ullman and Hopcroft, Design and Analysis of algorithms, Pearson education.

VI SEMESTER (Professional Elective – II)	L	T	P	C
	3	-	-	3
20CC6E03 : COMPUTER VISION				

Course Outcomes

After the completion of the course the students are able to

1. List out the fundamental image processing techniques required for computer vision. (K1)
2. Evaluate the shape analysis and Implement boundary tracking techniques. (K5)
3. Apply Hough Transform for line, circle and ellipse detections. (K3)
4. Illustrate 3D vision techniques and Implement motion related techniques. (K2)
5. Develop applications using computer vision techniques. (K3)

UNIT-I

Image Processing Foundations: Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture.

UNIT-II

Shapes And Regions: Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments.

UNIT-III

Hough Transform: Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation.

UNIT-IV

3D Vision And Motion: Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – spline-based motion – optical flow – layered motion.

UNIT-V

Applications: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

Text Books:

1. D. L. Baggioeal, ―Mastering OpenCV with Practical Computer Vision Projects‖, Packt Publishing, 2012.
2. E. R. Davies, ―Computer & Machine Vision‖, Fourth Edition, Academic Press, 2012.
3. Jan Erik Solem, ―Programming Computer Vision with Python: Tools and algorithms for analyzing images‖, O'Reilly Media, 2012.

Reference Books:

1. Mark Nixon and Alberto S. Aquado, ―Feature Extraction & Image Processing for Computer Vision‖, Third Edition, Academic Press, 2012.
2. R. Szeliski, ―Computer Vision: Algorithms and Applications‖, Springer 2011.
3. Simon J. D. Prince, ―Computer Vision: Models, Learning, and Inference‖, Cambridge University Press, 2012.

VI SEMESTER (Job Oriented Elective – II)	L	T	P	C
	3	-	-	3
20CC6J01 : CLOUD SECURITY				

Course Outcomes:

Upon completion of the course, it is expected that student will be able to:

1. Summarize the basic Cloud computing fundamentals and objectives of Cloud Security.
2. Apply the Cloud Security Principles and Security approaches required to be implemented across the different stages of Cloud development and maintenance.
3. Identify the risks associated in Cloud environment along with common issues, threats which will be faced in the Cloud.
4. Illustrate the Security challenges in Cloud computing
5. Analyze the Cloud Security Architecture and Security Execution and implementation of various Security mechanisms in Cloud computing.

UNIT-I:

Introduction to Cloud: Cloud Delivery Models, Cloud Deployment Models

Cloud Computing Software Security Fundamentals: Cloud Information Security Objectives, Cloud Security Services.

UNIT-II:

Cloud Security Principles in all steps: Cloud Security Design Principles, Secure Cloud Software Requirements, Approaches to Cloud Software Requirements Engineering, Cloud Security Policy Implementation and Decomposition, Secure Cloud Software Testing, Cloud Penetration Testing.

UNIT-III:

Cloud Computing Risk Issues: The CIA Triad, Privacy and Compliance Risks, Common Threats and Vulnerabilities, Cloud Access Control Issues, Cloud Service Provider Risks.

UNIT-IV:

Cloud Computing Security Challenges:

Security Policy Implementation, Policy Types, Computer Security Incident Response Team (CSIRT), VM Security Recommendations.

UNIT-V:

Cloud Computing Security Architecture and Design patterns Architectural Considerations, Trusted Cloud Computing, Secure Execution Environments and Communications, Identity Management and Access Control, Autonomic Security, Introduction to Design Patterns, Security Patterns for Cloud Computing.

Text Books(s):

1. Ronald L. Krutz Russell Dean Vines, Cloud Security - A Comprehensive Guide to Secure Cloud Computing Published by Wiley Publishing, Inc.
2. Securing the Cloud: Cloud Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier)

Reference Book(s):

1. Chris Dotson, Practical Cloud Security: A Guide for Security Design and Deployment, Published by O′Reilly, 1st Edition.
2. John Vacca, Cloud Computing Security: Foundations and Challenges, 2nd Edition CRC Press
3. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall)

VI SEMESTER (Job Oriented Elective – II)	L	T	P	C
	3	-	-	3
20IT6J02 : BLOCK CHAIN TECHNOLOGY				

Course Outcomes

After the completion of the course the students are able to

1. Discover the secure and efficient transactions with crypto-currencies (K4)
2. Experiment with crypto currency trading and crypto exchanges (K3)
3. Analyze the bitcoin usage and applications (K4)
4. Develop private blockchain environment and develop a smart contract on Ethereum (K3)
5. Build the hyper ledger architecture and the consensus mechanism applied in the hyperledger (K3)

Unit-I

CRYPTOCURRENCY AND BLOCKCHAIN- INTRODUCTION:

Blockchain- An Introduction, Distinction between databases and blockchain, Distributed ledger. Blockchain ecosystem - Consensus Algorithms & Types, Block chain structure, Distributed networks- Distributed Applications (DApps) – Web 3.0 - DApps Ecosystems. Working - Permissioned and permission-less Blockchain – Cross Chain Technologies. – IOT & Block chain - Digital Disruption in Industries – Banking, Insurance, Supply Chain, Governments, IP rights, Creation of trustless Ecosystems – Block chain as a Service – Open Source Block chains

Unit-II

CRYPTO CURRENCIES: Crypto Currencies - Anonymity and Pseudonymity in Crypto currencies - Digital Signatures – Crypto currency Hash Codes -Need for Crypto Currencies – Crypto Markets – Explore Crypto Currency Ecosystems - ICOs – Crypto Tokens - Atomic Swaps – Crypto Currency Exchanges – Centralized and Decentralized Crypto exchanges – Regulations on Crypto Currencies & exchanges – Downside of non-regulated currencies – crypto Scams – Exchange hacks

Unit-III

BITCOIN: Bitcoin – history- Bitcoin- usage, storage, selling, transactions, working- Invalid Transactions Parameters that invalidate the transactions- Scripting language in Bitcoin- Applications of Bitcoin script- Nodes and network of Bitcoin- Bitcoin ecosystem

Unit-IV

ETHEREUM: The Ethereum ecosystem, DApps and DAOs - Ethereum working- Solidity- Contract classes, functions, and conditionals- Inheritance & abstract contracts- Libraries- Types & optimization of Ether- Global variables- Debugging- Future of Ethereum- Smart Contracts on Ethereum- different stages of a contract deployment- Viewing Information about blocks in Blockchain- Developing smart contract on private Blockchain- Deploying contract from web and console

Unit-V

HYPERLEDGER: Hyperledger Architecture- Consensus- Consensus & its interaction with architectural layers Application programming interface- Application model -Hyperledger frameworks- Hyperledger Fabric -Various ways to create Hyperledger Fabric Block chain network- Creating and Deploying a business network on Hyperledger Composer Playground- Testing the business network definition- Transferring the commodity between the participants

TEXT BOOKS

1. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas M Antonopoulos 2018

2. Henning Diedrich, Ethereum: Block chains, Digital Assets, Smart Contracts, Decentralized Autonomous Organizations-2016

ONLINE REFERENCES

1. https://www.coursera.org/learn/ibm-blockchain-essentials-for-developers

2. https://museblockchain.com/

3. https://www.provenance.org/

4. https://www.coursera.org/learn/blockchain-basics

5. https://steemit.com/

6. https://101blockchains.comhttps://followmyvote.com/

VI SEMESTER	L	T	P	C
	-	1	2	1.5
20CC6L01 : CRYPTOGRAPHY AND NETWORK SECURITY LAB				

Course Objectives:

1. To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures.
2. To explain various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.
3. To familiarize symmetric and asymmetric cryptography

Course Outcomes:

At the end of the course, the students will be able to:

1. Identify basic security attacks and services
2. Use symmetric and asymmetric key algorithms for cryptography
3. Make use of Authentication functions

Experiments:

1. Write a program that contains a string (char pointer) with a value \Hello World'. The program should XOR each character in this string with 0 and display the result.
2. Write a program that contains a string (char pointer) with a value \Hello World'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Implementation of Caesar Cipher technique
4. Implement the Play fair Cipher
5. Implement the Pure Transposition Cipher
6. Implement DES Encryption and Decryption
7. Implement the AES Encryption and decryption
8. Implement RSA Encryption Algorithm
9. Implement the Diffie-Hellman Key Exchange mechanism

VI SEMESTER	L	T	P	C
	-	-	3	1.5
20IT6L01 : MACHINE LEARNING LAB				

Course Outcomes

After the completion of the course the students are able to

1. Apply Data summarization and visualization. (K3)
2. Develop and implement the Linear Regression Analysis (K3)
3. Develop and implement the Logistic Regression Analysis. (K3)
4. Apply the Classification using Support Vector Machine. (K3)

All the programs should be carried out using tools like Weka/Python/R-Programming/Orange.

List of Experiments

1. Installation and running of Scipy.
2. Data loading
3. Data summarization
4. Data visualization
5. Data Predictions
6. Case Study on Linear Regression Analysis
7. Case Study on Logistic Regression Analysis
8. Case Study on Data Classification using Support Vector Machine

VI SEMESTER	L	T	P	C
	-	-	3	1.5
20CC6L02 : CYBER CRIME INVESTIGATION & DIGITAL FORENSICS LAB				

Course Objectives

1. To provide students with a comprehensive overview of collecting, investigating, preserving, and presenting evidence of cybercrime left in digital storage devices, emails, browsers, mobile devices using different Forensics tools
2. To Understand file system basics and where hidden files may lie on the disk, as well as how to extract the data and preserve it for analysis.
3. Understand some of the tools of e-discovery.
4. To understand the network analysis, Registry analysis and analyze attacks using different forensics tools

Course Outcomes

1. Learn the importance of a systematic procedure for investigation of data found on digital storage media that might provide evidence of wrong-doing
2. To Learn the file system storage mechanisms and retrieve files in hidden format
3. Learn the use of computer forensics tools used in data analysis.
4. Learn how to find data that may be clear or hidden on a computer disk, find out the open ports for the attackers through network analysis, Registry analysis.

List of Experiments

1. Perform email analysis using the tools like Exchange EDB viewer, MBOX viewer and View user mailboxes and public folders, Filter the mailbox data based on various criteria, Search for particular items in user mailboxes and public folders

2. Perform Browser history analysis and get the downloaded content, history, saved logins, searches, websites visited etc using Foxton Forensics tool, Dumpzilla .

3. Perform mobile analysis in the form of retrieving call logs, SMS log, all contacts list using the forensics tool like SAFT.

4. Perform Registry analysis and get boot time logging using process monitor tool.

5. Perform Disk imaging and cloning the using the X-way Forensics tools.

6. Perform Data Analysis i.e., History about open file and folder, and view folder actions using Lastview activity tool.

7. Perform Network analysis using the Network Miner tool.

8. Perform information for incident response using the crowd Response tool

9. Perform File type detection using Autopsy tool.

10. Perform Memory capture and analysis using the Live RAM capture or any forensic tool.

TEXT BOOKS:

1. Real Digital Forensics for Handheld Devices, E. P. Dorothy, Auerback Publications, 2013.

2. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics, J. Sammons, Syngress Publishing, 2012.

REFERENCE BOOKS:

1. Handbook of Digital Forensics and Investigation, E. Casey, Academic Press, 2010
2. Malware Forensics Field Guide for Windows Systems: Digital Forensics Field Guides, C. H. Malin, E. Casey and J. M. Aquilina, Syngress, 2012
3. Brett shabers, Eric Zimerman, X-ways forensics practitioners guide

VI SEMESTER	L	T	P	C
	1	-	2	2
20CC6S01 : ANDROID PROGRAMMING LAB				

COURSE OUTCOMES:

After the completion of the course the students are able to

1. Outline the Android platform, Architecture and features. (K2)
2. Design User Interface and develop activity for Android App. (K4)
3. Apply Internet, Broadcast receivers and Internet services in Android App. (K3)
4. Build Database Application and Content providers. (K3)
5. Develop multimedia, camera and Location based services in Android App. (K3)

List of Experiments:

1. Installation of Android Studio.
2. Develop an Android Application using Widgets.
3. Develop an Android Application for Layout Managers and Event Listeners.
4. Develop an Android Application using Activity and Intents.
5. Develop an Android Application using Menus.
6. Develop an Android Application using Android Service.
7. Develop an Android Application using Multimedia.
8. Develop an Android Application using SQLite.
9. Develop an Android Application using Telephony –Call, SMS, and Email.
10. Develop an Android Application using Google Maps.

VI SEMESTER	L	T	P	C
	2	-	-	-
20BM6M01:PROFESSIONAL ETHICS AND INTELLECTUAL PROPERTY RIGHTS				

COURSE OUTCOMES:

Students are able to

1. Identify the professional roles played by an engineer and illustrate the process of Social experimentation (K3)
2. Determine Engineer's responsibilities and rights towards the society (K5)
3. Analyze various aspects of Intellectual Property Rights and recognize the process of protecting the copyrights (K4)
4. Outline the registration process of Patents and trademarks and also demonstrate the concept of trade secrets and cybercrimes (K2)

UNIT-I

ENGINEERING ETHICS:

Importance of Engineering Ethics - Professional and Professionalism – Professional Roles to be played by an Engineer – Professional Ethics.

UNIT-II

ENGINEERING AS SOCIAL EXPERIMENTATION :

Role of engineering in knowledge society- Knowledge acquired – Conscientiousness – Relevant Information –Engineers as Managers, Consultants, and Leaders.

ENGINEERS' RESPONSIBILITY FOR SAFETY AND RISK: Role and importance of Safety and risk- Types of Risks –Threshold Levels for Risk– RiskBenefit Analysis.

UNIT-III

ENGINEERS' RESPONSIBILITIES AND RIGHTS:

Collegiality-Conflict of Interest-solving conflict problems – Ethical egoism-Collective bargaining - Confidentiality-Acceptance of Bribes/Gifts--Occupational Crimes-industrial espionage-Whistle Blowing-types of whistle blowing.

UNIT IV

INTELLECTUAL PROPERTY AND COPY RIGHTS:

Introduction to Intellectual Property Law - Types of Intellectual Property –Infringement, Copyrights**:** Introduction to Copyrights – Principles of Copyright – Rights Afforded by Copyright Law – Copyright Formalities and Registration.

UNIT-V

PATENTS AND TRADEMARKS:

Introduction to Patent Law –Rights under Patent Law – Patent Requirements – Patent Application Process and Granting of Patent – Double Patenting – Patent Cooperation Treaty**.** Trademarks: Introduction to Trade Mark – Trade Mark Registration Process – Trade Mark maintenance – Likelihood of confusion

TEXT BOOKS:

1. M. Govindarajan, S. Natarajan and V.S. SenthilKumar- "Engineering Ethics and Human Values" by PHI Learning Pvt. Ltd-2009.
2. Deborah E. Bouchoux, "Intellectual Property". Cengage learning , New Delhi, BS Publications (Press)
   PrabhuddhaGanguli,' Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi